



农业对外合作之窗

农业对外合作与乡村振兴 系列丛书
Agricultural Foreign Cooperation and Rural Revitalization



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4

中国—埃塞俄比亚农业价值链合作研究

——以肉牛、芝麻产业为例

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RESEARCH ON CHINA-ETHIOPIA
AGRICULTURAL VALUE CHAIN COOPERATION

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CASE STUDY OF BEEF CATTLE AND SESAME

农业农村部对外经济合作中心 编著
Foreign Economic Cooperation Center,
Ministry of Agriculture and Rural Affairs, P. R. China

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序

中国与埃塞俄比亚（以下简称埃塞）自1970年建交以来，双边关系健康发展，合作历久弥新。中国已成为埃塞最大贸易伙伴、最大工程承包方和主要投资来源国。2019年两国政府签订了关于共建“一带一路”的合作规划。

农业是埃塞政府高度重视和重点支持的产业之一，也是中国和埃塞开展合作的重要领域之一。为进一步加强双边农业合作，在比尔及梅琳达·盖茨基金会（以下简称盖茨基金会）“埃塞与中国农业合作”项目支持下，2018年11月，中国农业农村部对外经济合作中心（FECC）与埃塞农业转型局（ATA）签署了《关于促进埃塞农业领域合作的谅解备忘录》。双方以识别战略合作机遇为目标，共同设计中国-埃塞农业合作方案，以构建农业价值链合作模式为抓手，以需求为驱动，以市场为导向，吸引中国私营部门加入，推动埃塞重点农业产业发展，促进提高埃塞农业生产能力和小农户的生计能力，实现互利共赢。在盖茨基金会和ATA的支持与协作下，针对埃塞方提出的肉牛和芝麻等重点农业产业的合作发展需求，FECC牵头开展了近2年的深入研究，于2019年5月和11月组团赴埃塞开展了17天实地调研，收集了丰富的一手素材，之后完成了相应的研究报告。

本研究的创新之处在于探索了农业价值链国际合作模式，注重合作的可持续发展。基于近年来农业“走出去”的实践经验，在此次合作中，FECC不偏重单个环节、单个合作类型，而是着力构建农产品的价值链合作模式，从田间到餐桌，从投入品到市场销售，抓住埃塞肉牛和芝麻产业价值链上的关键环节，结合中国肉牛和芝麻的产业发展经验，

邀请相关环节的资深专家和业内龙头企业，共同开展研究和实地考察。专家和企业代表均表示，通过对整个产业价值链的考察，了解了产品的上下游发展情况，有利于更好研判技术合作或投资项目的机遇和挑战。研究最终促成了产学研相结合、上下游相关联的价值链合作方案。

本研究得到了多方的关注和支持。特别感谢盖茨基金会对项目启动和执行给予的大力支持和通力合作。在项目推进过程中，我们得到了国内外众多部门和机构的广泛支持，包括中国海关总署、国家国际发展合作署、农业农村部国际交流服务中心、中国驻埃塞大使馆经济商务处、安徽省农业农村委员会、埃塞农业部、埃塞投资委员会、埃塞驻中国大使馆、联合国国际贸易促进中心、世界银行埃塞办公室、非洲绿色联盟等。我们邀请了价值链重要环节上的业内资深科研和技术团队、业内龙头企业、驻埃塞中资企业广泛参与，包括中国农业大学肉牛研究中心、中国农业科学院油料作物研究所、中国援埃塞高级农业专家组、梅特国际集团、中土畜通利进出口有限公司、青岛易邦生物工程有限公司、内蒙古东方万旗肉牛产业有限公司、康地谷物公司亚洲总部、英利华集团、合肥燕庄食用油有限公司、中垦锦绣华农武汉科技有限公司、传音控股有限公司、吾谷良品网络技术有限公司、中国土木工程集团有限公司埃塞俄比亚工程有限公司、中国中材国际工程股份有限公司埃塞分公司、埃塞亚宇农场等。中地海外农业发展有限公司埃塞分公司对本项目的实地调研给予了充分的当地活动支持。借此机会，向各方再次表示诚挚的感谢。

在研究后期，提出的部分合作建议已形成共识并进入实操阶段。ATA 于 2019 年 9 月赴中国山东青岛和内蒙古对有意向投资埃塞肉牛产业价值链合作的企业进行了实地考察，中资企业对埃塞的动物疫苗投资项目正紧锣密鼓推进，在埃塞开展肉牛养殖屠宰一体化项目的双方企业已开展多次商谈。在 2019 年 12 月召开的“首届中非农业论坛”上，合肥燕庄食用油有限公司、中垦锦绣华农武汉科技有限公司与埃塞 Hiwot Agriculture 公司（埃塞提格雷州最大的农业公司）、Desta Group 公司（埃

塞提格雷州大型农场)分别签署了“中国-埃塞芝麻国际订单农场项目合作备忘录”,双方企业计划在2020年芝麻生产季开始联合生产。随后埃塞驻华大使馆赴安徽和湖北对签约的两家企业和中国农业科学院油料作物研究所进行了实地走访。

但由于2020年突如其来的新冠疫情全球大流行,以及2020年11月埃塞北部芝麻产区发生动乱,本项目设计的大部分合作方案暂缓推进。可喜的是,中垦锦绣华农武汉科技有限公司与中国农业科学院油料作物研究所联合申请获批了湖北省国际合作领域重点研发计划项目“中国-埃塞俄比亚高产优质适宜机械化芝麻品种选育及示范”,此项目正与埃塞方共同执行中。全球正在努力抗击新冠疫情,埃塞芝麻产区的局势正趋于恢复稳定,为恢复经济发展和民众生活,双方合作的需求将愈加凸显。

希望本书的出版能够给相关机构和企业提供埃塞肉牛和芝麻产业价值链的一手素材,吸引更多的公共资源和私营部门加入合作,在各方的共同努力下,加快推进相关领域的务实合作,实现互利共赢,并促进双方在农业领域实现更广泛的合作。同时,也希望本书能够为其他农业国际合作提供价值链合作模式参考。

编 者



Preface

Since the establishment of diplomatic relations between Ethiopia and China in 1970, the bilateral relations between the two countries have developed well and our cooperation has a long history. China has become Ethiopia's largest trading partner, largest project contractor and major source of investment. In 2019, the two countries signed the "Belt and Road" joint development initiative.

Agriculture is one of the key industries supported by the Ethiopian government, and it's also one of the key areas of cooperation between Ethiopia and China. To further strengthen bilateral agricultural cooperation, supported by the "Ethiopia-China Agricultural Cooperation" program of the Bill & Melinda Gates Foundation, in November 2018, the Foreign Economic Cooperation Center of the Ministry of Agriculture and Rural Affairs (FECC) and the Ethiopian Agricultural Transformation Authority (ATA) signed the "Memorandum of Understanding on Promoting Cooperation in the Field of Agriculture in Ethiopia". The aim is to identify cooperation opportunities, co-design Ethiopia-China agricultural cooperation program, taking the development of agricultural value chain cooperation model as the starting point, in a demand-driven and market-oriented manner, attract Chinese public and private sector to come in to jointly promote the development of Ethiopia's key agricultural industries, improve the agricultural production capacity and the livelihood capacity of Ethiopian smallholder farmers, contribute to the reduction of poverty in Ethiopia, and achieve win-win results. With the support and cooperation of Gates Foundation and ATA, FECC has taken the lead in conducting in-depth study for nearly two years in response to the cooperative development needs of key agricultural industries such as beef cattle and sesame proposed by Ethiopia. In May and November of 2019, FECC organized delegations to come to Ethiopia and conduct 17

days of field research, during which time abundant first-hand materials were collected, and the corresponding research report was completed after the field research.

This study is unique in that it explores the international cooperation model of agricultural value chain and focuses on the sustainable development of cooperation. Based on the practical experience of “going out” in the field of agriculture in recent years, in this cooperation, FECC does not focus on single link and single type of cooperation, but on building a value chain cooperation model of agricultural products, from farm field to dinner table, from inputs to market sales, focusing on key links in the value chain of Ethiopia’s beef cattle and sesame industry, combining with the industrial development experience of China’s beef cattle and sesame industry, and inviting senior experts and leading enterprises in the industry to jointly conduct research and field visits. All experts and enterprise representatives stated that understanding the upstream and downstream development of products through the investigation of the entire industry value chain is conducive to better studying and assessing the opportunities and challenges of technical cooperation or investment projects. The research eventually led to the value chain cooperation plan of “integrating industry, university and research, and linking upstream and downstream links”.

This study has been emphasized on and supported by multiple parties. Special thanks to Gates Foundation for their support and cooperation in the initiation and implementation of the project. In the process of the project, we received extensive support from multiple institutions and departments in China and abroad, including the General Administration of Customs of China, China International Development Cooperation Agency, Center of International Cooperation Service of MARA of China, the Economic and Commercial Office of the Embassy of China in Ethiopia, the Agricultural and Rural Affairs Committee of Anhui Province of China, the Ministry of Agriculture of Ethiopia, the Investment Committee of Ethiopia, the Embassy of Ethiopia in China, the International Trade Centre of the United Nations, Ethiopia Office of the World Bank, African Green Union, etc. We invited the industry’s senior scientific research and technical teams, leading enterprises and Chinese funded enterprises in Ethiopia, including

the Beef Cattle Research Center of China Agricultural University, Oil Crops Research Institute of Chinese Academy of Agricultural Sciences (OCRI), senior agricultural expert group of China in Ethiopia, Meat International Group, China Tuxu Tongli Import and Export Co., Ltd., Qingdao Yebio Bioengineering Co., Ltd., Inner Mongolia Oriental Flag Beef Cattle Industry Co., Ltd., Asia headquarter of Continental Grain Company, Unival Group, Hefei Yanzhuang Edible Oil Co., Ltd., Wuhan Good-seed Technology Co., Ltd., Transsion Holdings, Wuguliangpin Network Technology Co., Ltd., China Civil Engineering Construction Corporation, Sinoma International Ethiopia, Ethiopia Yayu Farm, etc. CGCOC Ethiopia has given full support to the local activities of the field research of the project. We would like to take this opportunity to express once again our sincere thanks to all parties.

In the later stage of the study, some cooperation proposals have reached a consensus and entered the implementing stage. ATA went to Qingdao and Inner Mongolia of China in September 2019 to conduct on-the-spot investigation on enterprises intending to invest in the value chain cooperation of beef cattle industry in Ethiopia. Chinese funded enterprises are vigorously promoting animal vaccine investment projects in Ethiopia, and enterprises of both sides have held multiple discussions on the beef cattle breeding and slaughtering integration project in Ethiopia. At the “First Forum on China-Africa Agricultural Cooperation” held in December 2019, Hefei Yanzhuang Edible Oil Co., Ltd., Zhongkenjinxiu Huanong Wuhan Technology Co., Ltd., Ethiopia Hiwot Agriculture Co., Ltd. (the largest agricultural company in Ethiopia) and Desta Group Co., Ltd. (large farm in Ethiopia) signed the “Memorandum of Cooperation on China Ethiopia Sesame International Order-based Farm Project” respectively. The two companies planned to start the joint production in 2020 sesame production season. Subsequently, the Embassy of Ethiopia in China went to Anhui and Hubei provinces of China to visit the two contracted enterprises and OCRI.

However, the global pandemic of COVID-19 broke out in 2020, and unrest in sesame producing areas of Northern Ethiopia in November 2020, caused most of the cooperative projects designed for this project to be postponed. It is gratifying that Wuhan Good-seed Technology Co., Ltd. and the Oil Crop Research Institute of the Chinese Academy of Agricultural Sciences

have jointly applied for approval of the Hubei Province's key research and development project in the field of international cooperation "China-Ethiopia high-yield, high-quality suitable mechanized sesame variety selection and demonstration". This project is being implemented jointly with Ethiopia. The world is striving to fight against the pandemic and the situation in the sesame producing areas of Ethiopia is tending to be stable. In order to restore economic development and people's livelihood, the demand for cooperation between the two sides will become increasingly prominent.

It is hoped that the publication of this book can provide first-hand materials for the value chain of beef cattle and sesame industry in Ethiopia to relevant institutions and enterprises, attract more public resources and private sectors to join in the cooperation, accelerate the practical cooperation in relevant fields with the joint efforts of all parties, realize mutual benefit and win-win, and promote the two sides to achieve broader cooperation in the agricultural field. At the same time, it is hoped that this book can provide value chain cooperation model reference for other international agricultural value chain cooperation.

Editorial Board



畜牧业和芝麻产业在埃塞俄比亚的经济发展中占有重要地位，中国和埃塞在畜牧业和芝麻产业领域均具有扩大合作的潜能。埃塞拥有非洲最大和世界第五大牛群，但出口量微小；埃塞是世界芝麻的主要生产国和出口国，芝麻是埃塞第二大出口创汇产品。中国是国际牛肉、芝麻的主要消费国和进口国，也是埃塞芝麻的主要进口国。

本研究对埃塞肉牛和芝麻产业价值链开展了深入的案头研究和实地考察。埃塞的肉牛和芝麻产业具有较好的比较优势和发展潜力。但埃塞牛群的疫情、牛肉品质和成本等因素制约了埃塞进入广阔的国际市场，芝麻的低单产、高人工成本等因素制约了埃塞芝麻更好发挥国际竞争力。回顾中国的肉牛和芝麻产业发展历史，中国也曾经历相似的生产发展历程，通过近几十年的发展已在肉牛和芝麻产业价值链的各个环节都积累了丰富的经验和适宜技术，并随着国民经济的发展和收入水平的提高形成了巨大的消费市场和进口需求。

在肉牛产业价值链合作方面，建议埃塞方创造更良好的营商环境，吸引中国私营部门进入疫病防控和一体化生产环节。中方可与埃塞方在价值链的育种、育肥、饲料、防疫、屠宰等重点环节进行经验分享和技术交流，降低生产成本，提高牛肉品质。中国的科研机构 and 私营部门可在肉牛价值链的薄弱环节寻找技术和资本的合作机会，以疫病防控先行，新建疫苗、兽药厂，助力加强埃塞肉牛疫病防控能力；建设饲草种植、肉牛养殖和屠宰生产一体化示范项目，进行成本控制和品质提升；遵循埃塞活畜和肉类发展战略，在近期以扩大中东市场为主，在中长期开拓进入更广阔的国际市场。

在芝麻产业价值链合作方面，建议以提高单产、降低人工成本为核心目标，吸引中国公共部门和私营部门建立长期合作机制，开展品种改良、芝麻机械化生产等方面的技术合作和能力建设；基于埃塞芝麻产业成熟的生产组织体系，发展国际订单农业合作，在订单农场中嵌入适宜的育种、栽培技术和农机，保障埃塞芝麻的稳定销售。通过打造合作示范模式，吸引更多的中国私营部门加入，实现双方互利共赢，推动埃塞芝麻产业价值链的可持续发展。



Abstract



The livestock sector and sesame play an important role in the economic development of Ethiopia. China and Ethiopia have the potential to expand cooperation in the livestock and sesame industry. Ethiopia has the largest cattle herd in Africa and the fifth largest in the world, but its export volume is limited; sesame is the second largest export product of Ethiopia, and Ethiopia is a major producer and exporter of sesame in the world. China is a major international consumer and importer of beef and sesame, as well as a major importer of sesame from Ethiopia.

This program carried out in-depth desk research and field research on the value chain of beef cattle and sesame industry in Ethiopia. The beef cattle and sesame industry in Ethiopia have good comparative advantages and development potential. However, the epidemic diseases of cattle in Ethiopia, the quality and cost of beef and other factors restrict Ethiopia's entry into the broad international market. Sesame's low yield and high labor cost restrict Ethiopia from gaining greater international competitiveness. Looking back on the development history of beef cattle and sesame industry in China, we see that China has experienced a similar course of production and development. Through the development in recent decades, we have accumulated rich experience and suitable technologies in all links of beef cattle and sesame industry value chain, and formed a huge consumer market and import demand with the development of national economy and the improvement of income level.

In terms of beef cattle industry value chain cooperation, it is suggested that Ethiopia create a better business operation environment to attract Chinese private sector to come into the field of epidemic prevention and control and integrated production. China can share experience and technologies with Ethiopia in breeding, fattening, feed, epidemic prevention, slaughtering

and other key links of the value chain, so as to reduce production costs and improve beef quality. China's scientific research institutions and the private sector can seek opportunities for cooperation in technology and capital in the weak links of beef cattle value chain, prioritize epidemic prevention and control, build vaccine and veterinary drug factories, and help to strengthen the epidemic prevention and control capacity of Ethiopia; establish forage planting, beef cattle breeding and slaughter production integration demonstration projects, control costs and improve quality; the development of beef export market needs to follow the Live Animal and Meat Development Strategy of Ethiopia, with a focus on expanding the Middle East market in the near future and expanding into a broader international market in the medium and long term.

In terms of sesame industry value chain cooperation, it is suggested that the core goal should be to increase the yield per unit area and reduce the labor cost, attract the Chinese public and private sectors to establish a long-term cooperation mechanism, and carry out technical cooperation and capacity-building in variety improvement and mechanized production; based on the mature production organization system of the sesame industry in Ethiopia, we should develop international cooperation in order-based farming, embed appropriate breeding, cultivation technologies and agricultural machinery in order-based farms, and ensure the stable sales of sesame in Ethiopia. By creating a model of cooperation demonstration, more Chinese private sectors will be attracted to join in, so as to achieve mutual benefit and win-win results and promote the sustainable development of the sesame industry value chain in Ethiopia.



前言

埃塞俄比亚位于非洲东北部，面积110.36万平方公里，人口1.12亿（世界银行，2019），是具有3 000多年历史的文明古国和非洲第二人口大国。

近年来埃塞经济快速发展，是世界上经济增速最快的经济体之一，对外国投资者有着强大的吸引力。埃塞充分借鉴中国发展经验，实施以经济建设为中心、以农业和基础设施建设为先导的发展战略。埃塞于2010年发布了“增长和转型计划”（GTP），涵盖三个阶段：GTP I（2010/11—2014/15），GTP II（2015/16—2019/20），GTP III（2020/21—2024/25），目前已执行了前两个5年计划，取得了一系列重大进展。据世界银行统计，过去10多年间，埃塞经济年均增长率近10%，长期位居全球经济增长最快的10个国家行列。2019年，在全球经济低迷和国内发生严重干旱的大环境下，埃塞人均GDP为961美元，仍以9%的经济增长率领跑全球。

当前，埃塞正面临政府债务上升、外汇持续短缺、区域发展失衡等“成长中的烦恼”。但埃塞借鉴中国经验，建设工业园区，制定了财政激励政策、非财政激励政策等有力的招商优惠政策（见附录1），凭借丰沛的人口红利、低廉的营商成本和巨大的市场潜力，不断吸引着外国投资者赴埃塞开拓商机，中国则已成为埃塞外国投资最重要的来源国。

农业是埃塞国民经济和出口创汇的支柱，与中国具有优势互补和合作共赢的广阔空间。埃塞农业约占GDP的40%，农产品出口约占出口总额的80%。其中，埃塞的畜牧业直接和间接地为60%~70%的埃塞人口的生计作出贡献，而畜牧业的近一半为养牛业，芝麻则是埃塞第二

大出口创汇产品。中国是国际牛肉、芝麻的主要消费国和进口国，也是埃塞芝麻的主要进口国，中国也具备丰富的畜牧业、芝麻产业的发展经验和适宜技术。

为加强中国-埃塞的双边农业合作，在盖茨基金会的“埃塞与中国农业合作”项目支持下，在埃塞农业转型局（ATA）通力合作下，中国农业农村部对外经济合作中心（FECC）于2018—2020年牵头开展了中国-埃塞肉牛和芝麻产业价值链合作研究。

本书上篇为中国-埃塞肉牛产业价值链合作研究成果，下篇为中国-埃塞芝麻产业价值链合作研究成果。具体章节内容包括：①案头研究，基于已有文献资料和数据，对埃塞肉牛产业价值链的品种繁育、育肥、饲料、防疫、屠宰加工、出口和芝麻产业价值链的品种、种植、市场、出口等核心环节进行简要回顾。②分享中国经验与市场需求，邀请中国肉牛和芝麻产业价值链重要环节的资深专家加入项目组，梳理中国肉牛和芝麻产业价值链发展经验，对两国的相似阶段进行对比分析，分析了中国牛肉和芝麻产品的消费市场和进口需求。③开展实地调研，FECC邀请了对埃塞肉牛和芝麻产业价值链感兴趣的相关中国企业加入调研团，分享前期研究成果，识别实地调研详细需求，并于2019年5月和11月，分别赴埃塞实地考察肉牛和芝麻产业价值链的主要环节。两次调研团共邀请了10名专家、12家企业、2个国际机构参团，在17天时间里马不停蹄地开展了52场调研，收集了丰富的一手素材。④结合案头研究和实地考察，分析埃塞肉牛和芝麻产业价值链的发展潜力、国际竞争力和制约因素。⑤提出中国公共和私营部门参与埃塞肉牛产业、芝麻产业价值链发展的合作展望和建议。



Introduction

Ethiopia is located in the northeast of Africa, with an area of 1,103,600 square kilometers and a population of 112 million (World Bank, 2019). The country is an ancient civilization with a history of more than 3,000 years and the second most populous country in Africa.

In recent years, with rapid economic development, Ethiopia became one of the fastest growing economies in the world and a great attraction to foreign investors. Ethiopia fully learns from China's development experience and implemented the development strategy with economic construction as the center and agriculture and infrastructure construction leading the way. Ethiopia issued the *Growth and Transformation Plan* (GTP) in 2010, with three stages: GTP I (2010/11-2014/15), GTP II (2015/16-2019/20) and GTP III (2020/21-2024/25). At present, the first two five-year plans have been implemented and a series of significant progress has been achieved. According to the statistics of the World Bank, in the past 10 years, the average annual economic growth rate of Ethiopia has been nearly 10%, ranking among the top 10 fastest growing countries in the world for a long time. In 2019, against the backdrop of global economic downturn and severe domestic drought, Ethiopia's per capita GDP was 961 US dollars, still leading the world with 9% economic growth rate.

At present, Ethiopia is facing "growing pains" such as rising government debt, continuous shortage of foreign exchange and imbalance of regional development. Ethiopia learned from China's experience, built industrial parks, formulated financial incentive policies, non-financial incentive policies and other powerful preferential policies for investment promotion (see the Annex). With abundant demographic dividend, low business operation cost and huge market potential, Ethiopia has been continuously attracting foreign investors to explore business opportunities in Ethiopia, and China

has become the most important source country for foreign investment in Ethiopia.

Agriculture is a pillar of Ethiopia's national economy and foreign exchange earnings through export. Ethiopia and China have ample room for complementing each other and win-win cooperation in this aspect. Ethiopia's agriculture accounts for about 40% of its GDP, and the export of agricultural products accounts for about 80% of total export. In particular, livestock sector directly and indirectly contributes to the livelihood of 60%-70% of the population in Ethiopia, while nearly half of the livestock sector is cattle farming. Sesame is the second largest export product in Ethiopia. China is a major consumer and importer of beef and sesame in the world, and it's a major importer of sesame from Ethiopia. China also has rich experience and suitable technologies in the development of livestock and sesame industry.

In order to strengthen the bilateral agricultural cooperation between China and Ethiopia, supported by the "Ethiopia-China Agricultural Cooperation" program of the Bill & Melinda Gates Foundation, and with the full cooperation of ATA, FECC led the research on the Ethiopia-China beef cattle and sesame industry value chain cooperation from 2018 to 2020.

Part I of this book addresses the research results of Ethiopia-China beef cattle industry value chain cooperation, and Part II addresses the research results of Ethiopia-China sesame industry value chain cooperation. The contents of the specific chapters include: ① Desk research: based on the existing literature and data, a brief review of the breeding, fattening, feeding, disease prevention, slaughtering and processing, export of beef cattle industry value chain in Ethiopia, and the variety, planting, market, export and other core links of the sesame industry value chain in Ethiopia. ② Sharing China's experience and market demand, senior experts in China's beef cattle and sesame value chain were invited to join the program team, to share China's development experience, to make comparisons and analysis of the similar stages of the two countries, to analyze China's beef and sesame's consumption market and import demand. ③ Field research: FECC invited relevant Chinese enterprises interested in the value chain of beef cattle and sesame industry in Ethiopia to join the delegation to share their preliminary

research results and identify the detailed needs from field research. In May and November 2019, FECC went to Ethiopia to investigate the main links of beef cattle and sesame industry value chain. For the two delegations, 10 experts, 12 enterprises and 2 international institutions were invited. In 17 days, the groups carried out 52 research non-stop and collected rich first-hand materials. ⑤ Combined with desk research and field investigation, analysis of the development potential, international competitiveness, and constraints of the value chain of beef cattle and sesame industry in Ethiopia. 6. Cooperation prospects and suggestions for Chinese public and private sectors participating in the development of beef cattle industry and sesame industry value chain in Ethiopia.



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中国 - 埃塞肉牛产业 价值链合作研究



埃塞俄比亚的增长与转型计划二期（GTP II）为畜牧业发展制定了宏伟目标：计划在2025年之前成为非洲排名第一的畜牧业出口国，大幅提升在全球的畜牧产品竞争力，其中肉牛业是优先发展的子行业之一。

截至目前，埃塞与中国在畜牧业方面的相关合作除皮革制品业外还比较有限，两国间没有牛肉贸易，但两国在畜牧业方面仍存在扩大合作的机会。埃塞拥有世界排名第五的牛群存栏量，具有良好的发展潜力；而中国拥有畜牧业产业化发展的丰富经验，并且将持续保持全球第一大牛肉进口市场的位置。

根据ATA前期的研究，埃塞俄比亚目前的牛肉主要销往中东，出口附加值极低，且附加值分散在整个价值链，商业运作受限，出口量小。埃塞希望采用更具战略性和综合性的方法来解决价值链断裂问题，最终可以服务于未来庞大且不断增长的东亚/东南亚市场。通过引入经验丰富特别是那些与小农户以包容模式合作的私营部门参与牛肉生产，以及引入改善检验和检疫标准等有助于提高行业一体化程度的关键干预措施，支持埃塞在畜牧业发展方面取得成绩，而中国是具备提供一揽子支持措施的国家之一。

1 埃塞肉牛产业价值链文献回顾

畜牧业在埃塞经济中占有重要地位，占国内生产总值的20%^①、占农业国内生产总值的50%，提供了16%~19%的外汇收入来源。畜牧业不仅具有非货币社会价值，而且是储存和积累财富的最有吸引力的资产。

埃塞家畜中45%为牛，拥有非洲最大和世界第五大牛群。2016年埃塞牛存栏量近6 000万头，占全球牛存栏量的5%。尽管拥有庞大的活牛数量，但埃塞在2016年仅出口牛肉2.8万吨，占全球牛肉出口量的0.3%，在世界上仅排名第33位。

为了增加市场供应，埃塞于2016年制定的畜牧业总体规划（LMP）提出到2020年将红肉产量提高52%。但肉牛生产系统不足以实现其目标，必须引进和制定创新性干预措施，通过市场商业化机制提升生产率、增加牛肉供给，并采取措施吸引外商直接投资该领域。

本章根据ATA提供的相关文件和统计数据对埃塞肉牛产业价值链发展的现状、政府目标和主要制约因素进行简要回顾。

1.1 埃塞肉牛产业发展处于初级阶段

1.1.1 肉牛生产系统

埃塞的牛以农户分散养殖为主，主要有两个畜牧生产系统：①高原农作物-畜牧混合生产系统，该系统占地约为埃塞国土面积的40%，海拔超过1 500米，3 500万~4 000万头牛，每户平均2~5头，其中役用牛占40%~50%，奶牛占25%，役用牛中的公牛经过4~5年劳动后当作产肉动物出售。埃塞高原地区牲畜多为家畜，饲料以农作物秸秆和天然牧草为主，疾病流行率较低，供水相对充足。②低地畜牧生产系统，该系统占地约为埃塞国土面积的60%，海拔低于1 500米，有1 000万~2 000万头牛，每户平均10~15头，70%的母牛以乳用为主，公牛常被卖到高原地区用于耕作。

1.1.2 品种和繁育

埃塞大约有27个本地牛种，以及很少的几个外来牛种，如弗里斯牛、荷斯坦牛、娟姗牛和西门塔尔牛等。埃塞本地的博朗（Boran）牛在生长、繁殖、产奶量和胴体性状方面均优于其他本地牛种，肉质优良，饲料转化效率高。

埃塞本地品种牛的生产力因品种和管理方法而异，与其他国家在类似农业气候条件下成长的改良品种相比存在很大差距。提高家畜生产力和肉品质量的关键是提高遗传资源投入，如改良的配种公牛和青年母牛、遗传物质（精液）和液氮。目前，这些投入对农村养殖户来说明显不足。另外，自然和人工育种成功率很低，并缺乏管理措施。国家建立了肉牛品种改良中心和育种场，开展品种改良研究，并将改良后的牛分配给养殖者，但养殖者对其关注度有限。

1.1.3 饲料和育肥

埃塞动物饲养成本不断增加，在近7年增加了2倍。粮食作物竞争、牧场保护意识不足和季节性降水短缺造成牧草供应变动，低地的牧区和农牧区、高原的天然牧场过度放牧和管理不善，面粉、榨油副产品等农副产品和混合饲料短缺及价格偏高，最终导致区域间

^① 本章的数据资料主要来源于ATA提供的相关内部文件，详见参考文献。

饲养和育肥不均，制约了生产力发展。此外，畜牧业现代饲养技术知识和管理实践的不足，也是影响肉牛饲养效益的重要因素。

在埃塞，牛群育肥由传统小农户、小型育肥场和主要以出口为导向的大型育肥企业进行。育肥场对于牛源的数量和红肉的质量都发挥了调节和缓解市场牛源波动的作用。随着出口活畜的需求和埃塞国内市场对红肉的需求不断增加，这一模式正在迅速发展，育肥场在初级市场以低价收购架子牛或淘汰牛，然后通过高能量饲料饲喂使育肥牛增加附加价值，以便在利润更高的市场上销售。育肥场通过市场代理商或中小型贸易商即牛贩购买活牛，偶尔也从合作社购买。育肥场一般购买体重小于200千克的架子牛，所有用于出口的公牛都养在育肥场，直到它们的体重达到300千克的最低出栏标准。育肥场经常用租来的车运输活牛。受到经济能力的限制，承运商只能活动在一个狭窄的地理区域内；而饲料、水、土地等生产投入和信贷的缺乏，正在成为阻碍育肥场建设速度的因素。

目前全国每年经过育肥的牛数量不足100万头，占总头数的1.7%。埃塞的畜牧业发展规划提出，到2030年经过育肥饲养的牛只数量计划达到600万头以上。为了达到这个目标，需要大规模扩大育肥牛群的规模，将中小型肉牛专业养殖场的数量从2014年的3万个增加到2021年的57.7万个。

1.1.4 疫苗和兽药

埃塞农业部的畜牧资源部门负责疫苗和兽药的检疫服务和质量控制，并负责通过联邦研究机构和地方兽药实验室开展研究和疾病监测。虽然政府预算不足以满足从国内和国际采购药品的年度需求，但是政府机构仍是动物保健产品分销的主要机构。

位于Bishoftu市的国家兽医研究所(NVI)生产了23种针对不同细菌和病毒性疾病的疫苗。然而，其目前的生产能力尚不能满足此类疫苗的现实需求。目前政府已经不直接进口兽药，而是通过招标方式从私营企业批量购买当地制造或进口的兽药、设备和化学品，分发给各州管理部门。在政府的监管下，私营进口商在为小型养殖户进口、分发和供应兽药、设备和化学品方面发挥了重要作用。

缺乏规模性、系统性的动物免疫是扩大外国市场的主要障碍之一。埃塞有乡村级（最低的行政单位）的季节性传染病防疫项目，并主要为出口畜群打疫苗，无法根治疫病暴发，达不到世界动物卫生组织(OIE)规定的两年无疫病的出口标准。

1.1.5 营销和交易

埃塞的活畜交易市场有三个层次：①村级市场，这是一级市场，也是主要的市场，一般每周出售的牛少于500头。②集中市场，这是二级市场，每周牛的成交量为500~1000头。这些市场由中间商（贸易商和代理商，也称牛贩）主导，但也服务于当地屠宰户。③终端市场，一般位于大城市中心，主要是由中大型交易公司主导。这三个层次的市场组织比较混乱、分散，有各种类型的买家、卖家、中间商参与其中。市场之间的基础设施建设非常薄弱，大部分地区向市场供应动物的路程都非常艰难。

在大多数家畜市场，除了目视观察外，没有销售和购买动物的客观标准。多个中间商从小农户采购活畜的系统，使埃塞很难以具有竞争力的价格向出口市场提供优质肉类。

1.1.6 屠宰和加工

埃塞的肉类加工业正在崛起，城市屠宰场、出口屠宰场、肉贩、餐馆/酒店在其中发

挥着重要作用（图1-1）。商业化屠宰场是此环节的主要参与者，他们从商人那里购买活畜，或者直接通过市场代理商购买。大多数屠宰场是为达到出口目的而建立，但也有地方屠宰场为肉贩和国内零售商提供服务。

由于进口国的严格监管，埃塞几乎所有的红肉出口都需要通过正规渠道完成。自从有活畜出口和后院屠宰以来，约一半的牛在屠宰场外被屠宰。活畜和肉类的正规出口推动了在各地建立屠宰场和育肥设施的进展。屠宰场与育肥设施的地点选择又会受到饲料供应、航空运输、销售终端的距离临近市场以及家畜徒步行走路线距离屠宰场的距离等因素的影响。在大多数情况下，屠宰场收到顾客的订单后才进行屠宰。基于订单的屠宰场无法使其满负荷运转，当前屠宰场的平均产能仅约为设计能力的34%。大部分屠宰场缺乏现代化技术规程和标准化设施，缺乏生产半加工或深加工肉制品的能力，可生产的产品规格种类有限，肉品的品质难以保障。

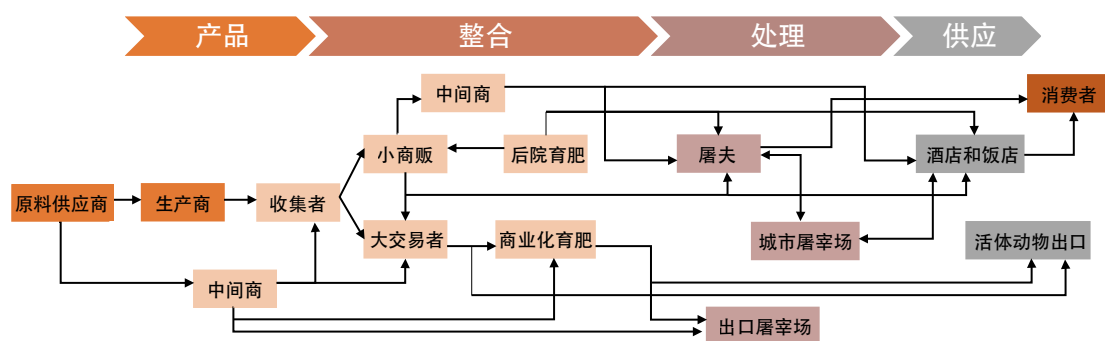


图1-1 埃塞家畜市场流程图

1.1.7 需求和市场

埃塞国内牛肉市场正在缓慢扩大。1993—2011年，人均牛肉年消费量保持在约5千克，但随着人口增长，牛肉消费总量年均增长率为3.2%。2014年牛肉价格比2005年高出约50%。2017年首都亚的斯亚贝巴市每千克优质、高端、中端和低端牛肉的价格分别为9.8美元、8.2美元、6.5美元和4.4美元。埃塞的国内红肉消费量较低的主要原因是肉品的市场售价高，低收入家庭难以负担；此外，埃塞东正教每年超过200天斋戒也影响了肉类的消费量。随着国民收入水平的提高，消费者将会消费更多的肉类，这一趋势将适用于埃塞。

埃塞牛肉出口占全球出口总额的比例很小，不足1%。主要有以下五个原因：①低出栏率（2013年为6%，中国为35%）；②大量活牛卖给了不规范的屠宰场或以非正规渠道出售；③大多数牧民只在有需要时出售牛，更倾向于维持牛群规模；④缺乏认证和国际标准；⑤出口市场因疫病和品质、成本等因素，国际竞争力不强。

埃塞的活畜出口受到进口国因疾病暴发而实施禁令的制约，最大的活畜出口国市场为苏丹、索马里、埃及、吉布提、沙特阿拉伯、也门和阿拉伯联合酋长国等。在红肉方面，埃塞的主要出口市场为中东。

1.2 主要瓶颈和SWOT分析

从对生产质量、数量和价格竞争力的影响角度考察，埃塞肉牛产业价值链中的主要

瓶颈包括如下几项：①相关政策支持、监管执法较弱。②由于成本高昂和高品质饲料的短缺，优质饲料投资不足。③缺少有效防疫，动物健康难以保障。④畜牧业市场导向型的生产经验不足。⑤由于市场发育不完善，中间商参与度很高。⑥下游市场联系薄弱。⑦运输基础设施有限导致肉质差。⑧中间商过多导致农民获取的利润空间很少。政府希望一旦解决了关键的价值链限制，埃塞就有机会成为3个核心市场的重要参与者：当务之急为中东市场；中期机会在东亚和东南亚市场；长期机会在高速增长的非洲市场。

相关研究对埃塞肉牛产业价值链进行了SWOT分析（表1-1）。

表 1-1 埃塞肉牛产业价值链 SWOT 分析

优势

- 畜牧业具有经济意义和创造就业机会的潜力；
- 拥有养牛和小型反刍动物养殖传统，也具有红肉的消费习惯；
- 政府制定了具有宏大愿景的畜牧业总体规划（LMP），并通过建立综合农业产业园区来实现农业部门的愿景；
- 已建立国家和地区层面的动物健康诊断中心；
- 已建立国家和地区层面的畜牧研究机构，开展相关技术研究，提高畜牧生产率；
- 已建立国家和地区层面的畜牧部门推广机构，并投入运行；
- 已建立国家兽医机构，可以生产多种活畜的疫苗；
- 各类大学和职业技术学院开始建成并培养农业方面的专业人才；
- 已有机构和项目/发展伙伴支持畜牧业领域，如已建立检疫站、育肥场、屠宰场和肉类加工公司。

弱点

- 政府对畜牧业的支持能力较弱；
- 在一些地区，由于人口压力、耕种面积扩大和土地退化，可用土地面积正在减少，缺乏土地利用政策；
- 本地品种牲畜的生产力很低，没有完善的可持续育种计划（包括国家数据库和有效的记录系统）；
- 牧草和饲料的质量与数量不足，进出口受限；
- 对畜牧业发展的研究基础差（例如育种和饲养技术薄弱等）；
- 动物管理不善，对现代畜牧业的了解有限；
- 供给动物的水主要来自溪流、湖泊等雨水集聚；
- 动物疫苗接种体系不健全，缺乏定期的随访和检查（没有动物检疫体系）。此外，影响经济重要性的动物疾病的发病率很高；
- 公共动物卫生服务和推广服务体系薄弱（如缺乏兽医诊所和专业推广人员），并且其提供的服务与生产者的需求和知识不相称；
- 在防疫服务方面，私营部门参与不足，主要仅涉及兽药和设备的销售；
- 非正规渠道交易在国内和出口市场仍占主导地位；
- 大多数生产者与加工商没有建立起很好的联系，且缺乏对商品化市场的激励；
- 在许多地区，生产不是以商业为导向，小型养殖户只是为了眼前的现金需求或为了处理非生产性动物而出售动物，因此，用于屠宰加工的优质动物供应能力有限；
- 在肉牛产业价值链的所有节点上的技术和资本投入均不足，并且获得信贷和金融服务的机会有限；
- 在国内市场，人均红肉消费量非常低。

机遇

- 与其他国家相比，埃塞经济持续增长，积极的经济前景有利于对畜牧业的投资；
- 有大量的家畜（牛和猪）存栏量，而且高原和低地地区有良好的牛羊生产潜力；
- 有多个本地品种牛可用于品种改良；
- 有相对廉价的劳动力，尽管大多数是无技能的工人；
- 人口增长和日益提高的城市化水平（城市中心新兴的中产阶级消费者群体），将有利于消费更多的红肉；
- 出口市场对博朗牛的需求量很大。

威胁

- 气候变化导致可供肉牛养殖地区的气候条件不稳定；
- 由于季节、空间和文化因素，活畜的供需关系不匹配；
- 进口国的质量要求和食品安全标准经常导致拒绝和禁止活畜（和肉类产品）进口；
- 生产率低的牲畜数量快速增加会带来一定的环境污染风险。

1.3 政府的发展目标和行动

1.3.1 畜牧业发展战略

埃塞增长和转型计划（GTP）包含了农业转型议程（TAD），采取系列干预措施促进埃塞农业部门转型。其中畜牧业发展计划的目标包括：减少国民贫困，实现更好的粮食安全，促进国民收入增长，增加出口和外汇收入，以及有助于减缓和适应气候变化。红肉的发展愿景是：满足由于人口快速增长、城市化进程增加和收入增加而产生的国内红肉消费需求，并增加活畜和肉类出口以创造外汇收入。

埃塞畜牧业总体规划提出了投资干预措施，如更好的遗传、饲料和健康服务，政策支持措施，通过提高主要家畜价值链的生产力和总产量来帮助实现GTP II的目标。

针对畜牧业转型，埃塞政府在以下四个领域提出了明确的可交付目标。

（1）畜牧遗传改良：①建立国家系统和制度安排，用以领导和协调家畜遗传评估和改良以及投入交付计划；②加强私营部门在畜牧遗传改良和投入品交付方面的作用。

（2）畜牧饲料和饲养：①为可持续生产创造有利环境，提供充足、优质和价格合理的饲料和牧草，并使免费放牧合理化；②改善牧区和农牧区的饲料和饮水安全。

（3）动物健康：①降低不同生产系统中幼龄和成年动物的死亡率；②加强和支持建立国家和地区兽医实验室的创新动物卫生服务和诊断能力及质量管理体系，以加强疾病预防和控制。

（4）畜牧市场：①加强高效和有效家畜销售系统的有利环境；②加强和发展畜牧业和产品市场基础设施及市场联系，以增强国内和出口市场能力。

1.3.2 农业产业园区

埃塞国家发展战略优先考虑发展综合农业产业园区。综合农业产业园区是一个由独立企业组成的地理集群，集中了产业运营和增长所需的基础设施、公用事业与服务条件，还可以与全球农业价值链建立联系。埃塞选择了四个农业产业增长走廊，正试点建立四个综合农业产业园区（详见附录2）。

奥罗米亚地区拥有埃塞全国最大的牛群，阿姆哈拉居次位。FAO曾于2017年协助埃塞政府为奥罗米亚中东部设计了一份综合农业产业园区的商业方案，计划到2020年通过提高商业化小型养殖户和育肥场的生产能力，增加优质牛源供应，通过畜牧市场渠道的正规化和商业化建设，促进奥罗米亚中东部试点综合农业产业园区农产品采购区的活畜和红肉价值链的快速和可持续增长，最终向国内市场和出口市场提供安全优质的红肉产品供应。

1.3.3 相关国际发展合作项目

埃塞政府积极吸引国际发展合作项目支持本国发展。在2018—2024年期间，国际发展项目预计将在埃塞畜牧业中投入至少1.97亿美元用于建立干预措施。其中89%来自世界银行的畜牧业和渔业部门发展项目（LFSDP）。该项目侧重于三个部分：①将更具生产力的农民与市场联系起来；②加强国家机构和计划；③项目协调、监测和评估以及知识管理。重点发展四种产品：红肉、乳制品、禽类和鱼类，计划覆盖奥罗米亚（Oromia）、阿姆哈拉（Amhara）、南方州（SNNPR）、提格雷（Tigray）、本尚谷勒古马兹（Benishangul Gumuz）、甘贝拉（Gambella）6个州的58个县，超过120万个家庭将从项目中受益。

2 中国肉牛产业发展经验

2.1 产业发展变迁

中国肉牛产业经历了役用牛→役肉兼用牛→肉役或肉乳兼用牛→肉用牛的发展阶段，2019年中国牛（含肉用牛、役牛和奶牛）存栏总数9 138万头，居世界第三位。经过改革开放40多年的发展，中国肉牛产业取得了长足的进展，已从一个传统产值不足10亿美元的畜牧产业成长为具有千亿美元级潜力的创新型产业^①。

2.1.1 1980年之前的役用牛阶段

在改革开放之前，中国没有独立的肉牛产业。早在4 000多年前的夏商时期，中国将野牛驯化成了家牛，俗称黄牛。在历史上，中国的黄牛主要作为役用和祭祀，只有老残牛才作为食用。新中国成立后，1950年中国各类牛存栏量4 810万头，主要类型有役用黄牛、奶牛、牦牛和水牛等，到1978年增长至7 072万头。该阶段农业机械化程度不高，传统的耕作劳动和农民生产生活等基本活动主要依赖于畜力，家牛以役用为主。

2.1.2 1980—2000年的役肉兼用牛阶段

该时期随着农业机械的普及和牛肉消费市场需求的的增长，传统的役牛或耕牛开始逐步退出历史舞台。为提高肉用性能，中国开始从美国、加拿大、法国和澳大利亚等肉牛业发达国家引进纯种肉用牛的冻精和胚胎，改良本地黄牛，应用最多的外国肉牛品种为西门塔尔、夏洛来、利木赞和其他少量牛种。改良后的杂种牛肉用性能明显提高，但直到2000年，中国役用牛群的数量一直占主导地位（图2-1）。

在该阶段，活牛和牛肉国际贸易开始出现，但数量很小。在出口方面，活牛和牛肉有少量出口，2000年活牛出口为64 770头，出口额3 796万美元，牛肉出口2万吨，出口额2 336万美元，主要出口市场为中东和俄罗斯等国家。在进口方面，活牛和牛肉进口数量均很少，活牛进口主要是少量种公牛，2000年牛肉进口量为5 600吨，进口额627万美元。

2.1.3 2001年之后的肉役或肉乳兼用牛和肉用牛阶段

在牛肉需求市场的强势拉动下，从2000年开始，中国的肉牛产业发生了向肉役兼用并以肉用为主的方向快速转变，肉牛已成为举足轻重的畜牧业支柱产业。由图2-1可以看出，2000年是中国役用牛向肉用牛快速转化的拐点，从这一年开始，中国的牛存栏总量开始下降，但肉用牛存栏数快速上升，而役用牛存栏数快速下降。与2000年（存栏5 837万头，出栏3 965万头）相比，2019年肉牛存栏和出栏分别达到6 998万头和4 534万头，分别提高20%和14.3%。2019年，在总存栏的8 094万头牛中，肉用牛已占86.5%，而役用牛比例只占总数量的13.5%。随着肉牛改良速度的加快，预期中国的役用牛在未来5～8年内将基本消失。

该阶段牛肉产量从2000年的513万吨提高到2019年的667万吨，增长30.1%，但中国消费者对牛肉的消费需求增长更快，中国肉牛产业的产能已不能满足本国需求，进口快速增长，对消费及进口的分析详见第3章。

^① 本章的肉牛产业价值链相关数据和技术情况主要由中国农业大学肉牛研究中心孟庆翔教授团队提供。

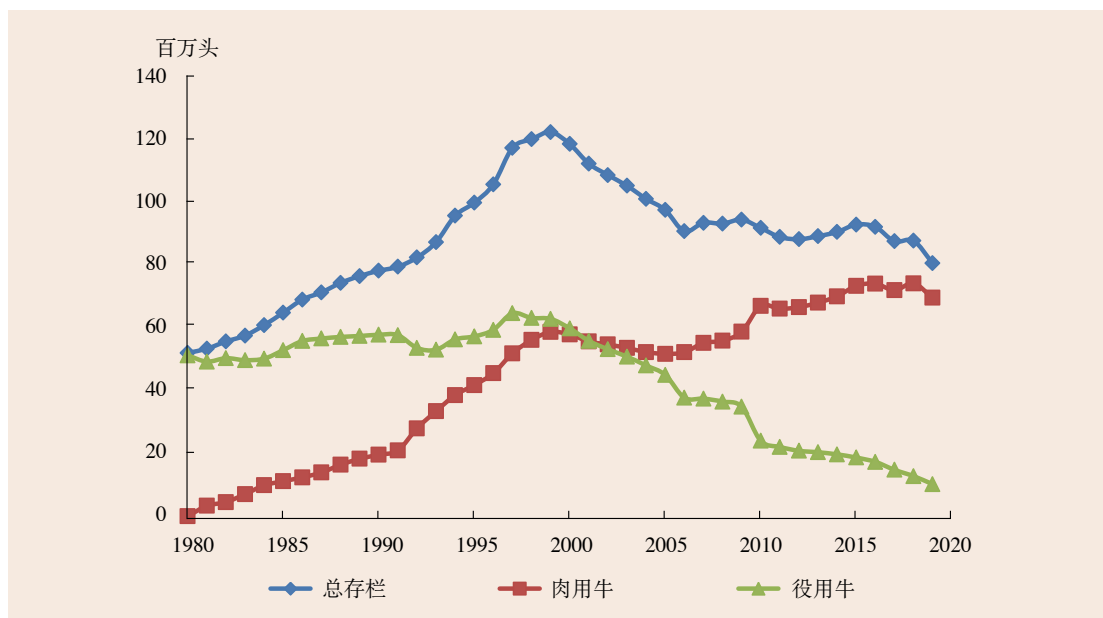


图2-1 1980—2019年中国肉用牛和役用牛存栏数

数据来源：《中国畜牧兽医统计》(2000—2019)。

2.2 产业特征

2.2.1 优势区域集中

中国肉牛优势产区位于4大区域，即中原区、东北区、西北区和西南区，均为育犊母牛、架子牛和肥育牛的主要生产基地。其中中原肉牛区包括山东、河南、河北和安徽4省51个县（市），属于传统农区，谷物籽实和秸秆资源丰富。东北肉牛区包括吉林、黑龙江、辽宁、内蒙古和河北5省（自治区）60个县，为牧区、农区和半农半牧区。西北肉牛区包括新疆、甘肃、陕西和宁夏4省（自治区）29个县（市），草地和农作物资源丰富。西南肉牛区包括四川、重庆、云南、贵州和广西5省（自治区、直辖市）67个县（市），草山草坡和农作物副产品供给充足。

2.2.2 肉牛品种资源丰富

中国主要的肉牛品种来源于地方品种黄牛，其中最具代表性的为秦川牛、南阳牛、晋南牛、鲁西牛、延边牛、蒙古牛、三河牛、新疆褐牛和草原红牛。

由于几千年的驯化和培育，中国黄牛的品种特性更加适合役用，而非肉用。为借鉴国际肉牛产业先进经验，中国从20世纪80年代开始引进国外优秀肉用品种资源，在国内进行肉牛新品种的培育。经过不懈努力，先后培育出了夏南牛、辽育白牛、延黄牛、云岭牛、蜀宣花牛等新品种。2016年以来，中国从澳大利亚、新西兰、乌拉圭和智利等国家进口了20多万头安格斯、海福特和西门塔尔等种用母牛，持续进行品种改良。目前，中国共有77个肉牛和黄牛品种，此外，还有11个牦牛品种、26个水牛品种和1个大额牛品种。

随着《全国肉牛遗传改良计划（2011—2025）实施方案》进一步推进，中国肉牛核心育种场建设更加规范，国家肉牛核心育种场现已发展至38家，种群生产性能显著提高。一些有条件的种畜场和育肥企业开始探索适宜当地生态和育肥条件的高档肉牛繁育模式。

中国肉牛种群选育的主要技术手段为常规性能测定，分子辅助育种技术正逐渐渗透至肉牛种群选育过程中，且与传统表观性状选种结合得更加紧密，使得肉牛种群选育效率更高。肉牛全基因组选择分子育种技术体系正推广至核心育种场的种子母牛遗传评估，对提升生产效率、种业国际竞争力起到了重要作用。在地方肉牛遗传资源挖掘和利用方面，继续有序开展当地黄牛杂交改良和提纯复壮，提高肉用性能。

2.2.3 养殖趋于规模化

(1) 传统农区养殖。农区的肉牛传统养殖主要依靠农民的役用牛和奶牛养殖中的淘汰牛，其特点是秸秆资源较为丰富，以秸秆作为饲料，养殖成本相对较低。但传统农区的肉牛养殖规模一般较小，养殖技术水平不高，肉牛生长速度慢，肉牛的出栏率、屠宰率和牛肉品质等各项性状指标和经济指标都比较低。该模式的牛肉产品质量不高、数量不足，不能满足快速增长的市场需求。随着农业生产的规模化和机械化程度的不断提高，淘汰牛和役用牛的养殖将逐渐退出历史舞台。

(2) 放牧育肥。牧区肉牛养殖一般采用放牧育肥，牧民利用丰富的天然牧草资源放牧，同时肉牛的排泄物又可以作为牧草生长的有机肥料，形成一个比较有序的循环生态链。但近些年的超载放牧和掠夺式生产已导致草场退化和环境恶劣等问题的出现。因此，牧区的传统养殖模式也难以满足牛肉市场需求。

(3) 集约化规模育肥。经过30多年肉牛养殖模式的实践探索，中国肉牛养殖已从小农户经营为主走向适度规模化的道路。如表2-1所示，2019年出栏牛头数在1~9头的比例已从1980年的98.5%降至50.9%，年出栏10~49头的牛场约占21.7%，出栏50~99头的牛场占9.8%，出栏100头以上的牛场已占17.6%。适度规模养殖模式下的育肥牛出栏速度快、生产效率高、牛肉品质好。“牧繁农育”“北繁南育”“母牛分散育肥和肥育牛集中舍饲”正在成为中国肉牛产业的主流养殖方式。

表2-1 全国肉牛饲养规模比重变化情况(%)

年出栏头数(头)	1980年	2019年
1~9	98.5	50.9
10~49	1.3	21.7
50~99	0.1	9.8
100~499	0	10.0
500~999	0	3.3
1000以上	0	4.3

数据来源：《中国畜牧兽医统计2019》。

2.2.4 饲料生产本土化

中国肉牛饲养所需的饲料完全由国内自主生产和供应，这得益于中国完善的饲料工业体系建设。2011年中国商品化饲料产量达到2亿吨，超过美国居世界第一位，此后中国已连续9年领跑全球饲料工业发展。2020年中国配合饲料总产量达25276万吨，饲料产品产值1291亿美元。

(1) 农户自产饲料原料加浓缩料。大部分农牧区的肉牛养殖农户通常可由家庭种养结合方式自行解决作物秸秆、青贮饲料等粗饲料供应以及精料补充料中能量饲料的供应,如玉米、小麦麸、稻米糠等,加上从附近的商业化饲料加工厂购买的蛋白质浓缩饲料,就可以配制出营养价值基本符合肉牛营养需要的饲料。

(2) 小型化低价位的饲料加工设备广泛应用。随着中国肉牛养殖业中人工成本的增加,使用机械辅助肉牛养殖过程的饲料加工和饲喂已是常态。在一般的农户规模肉牛养殖场,精饲料原料的粉碎、混合和全混饲料粮的制作设备,以小型化低价位的加工设备应用最为广泛。

(3) 饲料科技助力肉牛养殖业。随着饲料价格的升高和国家关于畜禽饲料全面禁抗政策的实施,肉牛生产领域迎来了一次新的技术革命。以“减量替代”为目标的饲料科技正在广泛开展。“减量”指少用成本较高的玉米和豆粕等原料的用量,改用小麦、棉籽粕、菜籽粕、花生粕和其他地方性副产品饲料资源;“替代”指采用各种提升动物抗病力、促进生长发育的产品来替代饲用抗生素的使用,从而保证消费者的健康和餐桌上的安全。这些替代产品包括酶制剂、植物提取物、免疫增强剂、活菌制剂、有机酸等。

2.2.5 疫情防控体系基本形成

(1) 国家动物疫病防控体系建设。根据1997年颁布的《中华人民共和国动物防疫法》,中国动物疫病的防控采取分病种、分区域、分畜禽分类指导、差别化管理、突出重点和统筹推进的策略。2012年5月,中国制定了《国家中长期动物疫病防治规划(2012—2020年)》,明确列出优先防治的国内动物疫病16种和重点防范的外来动物疫病13种,到2020年,口蹄疫等16种优先防治的国内动物疫病达到规划设定的考核标准,牛的发病率下降到4%以下,动物发病率、死亡率和公共卫生风险显著降低。中国动物疫病防治正在从有效控制向逐步净化消灭过渡,疫苗和诊断技术是肉牛疫病防控的重要技术支撑。

(2) 建立了县乡两级基层动物防疫体系。全国各县均设有动物防疫监督机构,乡镇设有动物卫生防疫站,形成县乡共管、以县为主的基层动物防疫体系,承担基层动物防疫检疫的具体工作。在肉牛养殖链环节,县级动物防疫监督机构负责分发由国家统一调拨的免费疫苗,并培训乡镇级的一线防疫人员,乡镇的基层防疫人员负责完成肉牛的接种注射、建立免疫台账、信息上报等工作。中国肉牛使用的口蹄疫、布鲁氏菌、巴氏杆菌、牛传染性胸膜肺炎、牛传染性鼻气管炎、牛病毒性腹泻等所有疫苗,均为中国国内生产的疫苗。

2.2.6 屠宰加工体系初步建成

中国的肉牛年屠宰量约为4300万头,以小作坊屠宰为主,产品主要供应农贸市场等,年屠宰量在1万头以上的规模企业有250多家,年屠宰量约占年总量的10%,产品主要供应大型商超、餐饮集团等。肉牛屠宰加工企业绝大部分采用清真屠宰方式,而且同时兼营肉羊屠宰。屠宰设备以国内制造为主,劈半锯、刀具和包装设备等少量设备从欧美等国引进,冷藏设备设施已全部实现国产化。

(1) 由分散屠宰逐步转为定点屠宰。在生猪实行“分散经营、统一纳税、集中检疫、定点屠宰”方针有效地保障了猪肉消费安全及卫生之后,肉牛屠宰企业也在实行肉牛定点屠宰的做法。商务部于2004年下发了《关于加强牛羊屠宰管理工作的指导意见》,明确提出了肉牛参照生猪定点屠宰和集中检疫的管理制度要求。在北京、上海、深圳、浙江、福建、广州等大型牛肉消费地区,肉牛屠宰均已实行定点屠宰和集中检疫管理制度,以保证

消费者的牛肉消费安全。

(2) 大型屠宰企业实行屠宰过程追溯管理制度。年屠宰量超过1万头的肉牛屠宰企业基本实行了基于RFID标签和二维码的食品安全追溯系统,实现肉牛从活牛屠宰到分割牛肉进入超市终端的追溯管理。

(3) 官方兽医负责肉牛屠宰过程的检疫检验。在待宰牛进入屠宰线前,畜主需向驻场官方兽医或动物检疫员提供官方检疫合格证明,宰前检验确保不让病死牛进入屠宰间,宰后检验以检查问题牛肉和内脏不流入市场。屠宰场还要求进行水分含量快速检测,如发现牛肉水分含量超过78%,按注水肉处理,不得流入市场。如发现国家规定的检疫需上报的传染病必须及时上报。

(4) 一批肉牛屠宰企业及其牛肉优质品牌已经脱颖而出。“科尔沁”“秦宝”“恒都”“阳信伊利源”“呼伦贝尔肉业”“祁连牧歌”“东方万旗”等一批优秀屠宰企业连同其牛肉品牌,已成为中国不同地区牛肉市场优秀企业和优质品牌牛肉产品的代表符号。这些牛肉生产企业经历了过去几十年中国肉牛产业发展的洗礼,积累了丰富的生产和成本控制经验,也积累了广泛的市场销售渠道。

2.2.7 产业技术服务体系持续完善

政府建立了完备的肉牛产业技术推广体系,从国家层面的全国畜牧总站和中国动物疫病预防控制中心,至各省、市、县的畜牧兽医管理部门,承担着全国肉牛产业价值链环节各项技术在农牧民养殖环节的推广和应用。

中国肉牛产业从科研到生产的专业化人才队伍已经形成。随着2010年农业部启动“国家农业产业技术体系项目”,一个由400多名科技人员组成的覆盖中国肉牛产业链各个环节的高层次肉牛产业技术专家队伍,进入全国肉牛产业的第一线,针对肉牛产业的痛点问题提出解决方案;每年由各级各类大学、高等专科学校和各类职业学校涉农专业招收动物科学与动物医学类专业学生达10万人以上,经过3~6年不等的学习,可以充实到肉牛产业相关环节就业。

综合来看,中国肉牛产业价值链体系已基本形成。由国家核心育种场、省级种公牛站、繁殖母牛场、育肥场、屠宰分割场、社会化服务机构组成了中国完整的肉牛产业链体系;以肉牛品种标准、育肥标准、饲料原料标准、生产过程标准、牛肉产品质量安全标准、实验室检测标准为内容的国家肉牛标准化体系也已基本成型。

2.3 经验和不足

总结中国肉牛产业发展的经验,市场拉动、政策引导、经营模式、技术保障、金融支持、国外投资等因素对中国肉牛产业的发展发挥了重要作用。

(1) 牛肉消费需求的市场强劲拉动效应。中国人均GDP水平1980年仅为290美元,2000年达到959美元,而2019年已达到10276美元。随着收入水平的提高,消费者对肉类的消费升级,直接拉动牛肉消费量提升。中国人均牛肉消费量从1980年的0.3千克增加到2019年的6千克,增长了19倍。

(2) 政府的产业政策和技术推广系统发挥重要作用。改革开放以来,政府连续出台了《1996—2000年全国秸秆养畜过腹还田项目发展纲要》《肉牛肉羊质量安全推进计划(2003—2007年)》《全国肉牛优势区域布局规划(2008—2015年)》《全国肉牛遗传改良计划(2011—

2025年)》《全国牛羊肉生产发展规划(2013—2020年)》《全国草食畜牧业发展规划(2016—2020年)》《关于促进草牧业发展的指导意见》等一系列政府文件。这些政策从顶层设计的角度完成了全国肉牛产业区域布局,为肉牛业经营主体指明了方向,大大推进了肉牛产业的发展速度。政府还建立了完备的技术推广体系,培养了从科研到生产的专业化人才队伍。

(3) 有效的生产组织模式提升了企业活力和农户养牛积极性与盈利性。在生产中逐渐形成的“家庭农场模式”“公司+农户模式”“公司+合作社+技术模式”等不同经营模式,使得繁殖母牛、犊牛、架子牛和肥育牛经营主体在养殖、屠宰、销售等经营活动中获得了利益。

(4) 引入外资和外企,融入国内金融保险业。改革开放以来,中国在肉牛生产和牛肉市场准入领域的开放程度不断加大,来自泰国、澳大利亚、美国、韩国、日本等国家的一些外资企业在中国投资饲料、养殖、加工、设备等价值链重要环节,采取独资或合资等方式开展经营。例如,泰国正大集团最早于1979年在中国建立饲料企业;美国查维斯机械公司于2006年建立了专门生产和经销畜牧屠宰设备的查维斯机械(北京)有限公司;澳大利亚汉考克牧业集团与中国新希望集团合作,在浙江建立即宰肉牛育肥和屠宰加工厂等。这些外资的引入,不仅使中国的肉牛行业变得更加多元化,而且也为中国传统的肉牛行业带来了国际先进管理理念和技术,加快了中国肉牛产业与国际接轨的速度。

作为重资产和易受疫病风险影响的行业,肉牛业的发展需要保险业和金融资本的介入。近5年来,随着肉牛产业的规模扩张和质量提升,“海尔农业金融”“中国人保财险”“中华联合财产保险”等一批金融保险机构加入了肉牛保险和融资的行列,各类政府性和商业性金融保险机构在中国肉牛产业上的保险和贷款投资已经超过100亿元,为肉牛产业的发展提供了强大的风险和资金保障。

(5) 集成国际先进技术,对标国际标准。中国肉牛产业的快速发展,得益于国际肉牛品种引进选育、繁殖改良、育肥管理、疫病防控、环境控制、福利保障、屠宰分割等方面的标准化技术与先进管理经验的集成。通过多边和双边合作,引进、消化、吸收肉牛产业国际先进技术与经验,在肉牛全行业对标国际标准、规范和指南,使中国的肉牛产业技术在不到30年的时间里走完了肉牛业发达国家50~80年的发展历程。

(6) 中国肉牛产业存在的不足。肉牛产业在满足中国消费者牛肉需求方面发挥了不可替代的作用,但仍存在很多不足。一是养殖规模不大。500头养殖规模的肉牛场尚不足5%。二是疫病风险仍是影响养牛效益的主要因素。中国虽然在牛病防控上取得很大成绩,但是目前全国范围内的疫病防控状态仍然十分严峻,如布鲁氏菌病、口蹄疫、牛结核病、牛病毒性腹泻、牛传染性鼻气管炎等疫病在很多地方仍呈现流行态势,且流行情况日益复杂,需要加强疫苗和特效药的研发、审批、生产和推广力度。三是肉牛产业新型实用技术的研究推广速度与生产需要相比仍然滞后。新品种选育、肉牛育肥标准、牛舍设计和建造、胴体分割标准等,仍有待加速研究和推广。

2.4 中国与埃塞肉牛产业发展比较

中国改革开放初期(基于1980年数据)与埃塞近年来(基于2017年数据)的肉牛产业发展水平有很多相似之处。从宏观基础看,两者的外汇储备量非常接近。从产业基础看,埃塞当前的存栏量略有不及中国当年,但两者的牛群皆是以役用为主。从牛肉消费

看，埃塞牛肉总量和人均消费量均高于中国当年，表明埃塞有更好的国内牛肉消费基础。两者皆以出口创汇为牛肉生产目标，出口市场均以中东地区为主。在品种、育肥、屠宰性能等方面，两者具有高度的相似性。

中国肉牛存栏量和牛肉产量均居于世界第3位，中国的经验和技術对具有相似发展基础的埃塞肉牛产业的发展可提供积极借鉴（表2-2）。

表2-2 埃塞2017年和中国1980年发展肉牛业的宏观基础和产业条件对比

指标	埃塞（2017年）	中国（1980年）
宏观基础		
国土面积（万平方公里）	110.4	960
耕地面积（万公顷）	1 320	16 593
人口（万人）	10 500	98 705
粮食产量（万吨）	2 312	32 056
GDP总量（亿美元）	806	2 149
外汇储备（亿美元）	30	25
人均GDP（美元）	873	290
人均GDP世界排名	161	95
产业基础		
存栏牛头数（万头）	6 000	7 200
产业功能	役用为主	役用为主
牛肉消费		
牛肉总产量（千吨）	459	269
人均牛肉消费（千克）	3.2	0.3
活牛和牛肉消费目标	出口创汇为主	出口创汇为主
牛肉与活牛出口市场	中东国家为主	中东和苏联
品种和育肥		
育肥优势牛种	本地牛和婆罗门	本地黄牛
繁殖方式	本交为主	本交为主，少量人工授精（AI）
主要能量饲料	玉米、高粱等	玉米、小麦麸等
主要蛋白质饲料	大豆粕等	大豆粕、酒糟、棉籽粕等糟渣类
主要粗饲料	秸秆和青贮饲料	作物秸秆、天然牧草、副产品类
肥育期埋植激素	允许埋植	不允许埋植
饲料添加剂工业	无	靠进口，国内刚刚起步
配合饲料工业体系	无	无
屠宰性能		
出栏体重（千克）	225	240
胴体重（千克）	108	114
头均产肉量（千克）	89	93
出栏率（%）	6	10

数据来源：调研团专家整理。

3 中国牛肉消费与进口

3.1 消费特征

3.1.1 消费总量庞大且增长快速

2019年中国牛肉市场规模约为5 881亿元^①，牛肉消费量为925万吨，居于全球牛肉消费总量第2位，仅次于美国，人均消费量6.7千克，已比世界人均消费水平高出0.4千克，2019年12月全国牛肉均价为70元/千克。

中国的牛肉消费从2012年开始进入了一个高速增长期，且仍有巨大发展空间。随着中国中产阶级数量的膨胀，消费升级促使肉类消费结构发生改变，中国对于高质量动物蛋白的需求不断增加，对牛肉的需求更是与日俱增。在中国猪肉消费比重正在下降，牛羊肉以及禽肉消费比重上升较快，更健康的牛羊红肉在未来还将获得持续的增长空间。发达国家的肉类消费中牛肉消费占比为18%~28%，而中国仅为3%，因此还具有很大的发展空间。梅特国际集团（MIG）预测中国的牛肉消费增长会持续到2025年，并且每年保持2%以上的增长率。

近年来中国餐饮业的迅速发展是刺激中国牛肉消费量上升的主要因素，中国的牛肉市场主要为商业对商业（B2B）市场。中国市场对牛肉的消费大部分来自餐厅和加工品，分别占中国牛肉消费比重的54%和30%，只有16%的消费量直接进入家庭。快速进步的餐饮业大量借鉴了西方的烹饪方式，不断刺激着牛肉需求的增加，中式火锅也是中国消费牛肉的重要途径。因此，符合餐饮和加工厂需求的产品规格在市场的流通性更高。

3.1.2 国内供给缺口增大

中国肉牛养殖产业受到自然条件、城镇化等诸多因素制约，产能提升较缓，不能满足快速增长的市场需求，供需缺口持续扩大，进口需求快速增长。2019年，中国消费的74%牛肉为自产，进口牛肉消费占比首次突破25%。

3.1.3 进口需求快速增加

中国进口牛肉市场以2012年为爆发点，年均增长率超过29%，是发展最快的行业之一（图3-1）。在此后8年间，中国快速成长为全球最大的牛肉采购国，占全球贸易量的1/8，迅速成为全球牛肉贸易体系中的关键角色。仅就2019年中国牛肉市场数据来看，月均进口量突破10万吨。因而，中国进口牛肉行业正处于蓬勃的发展阶段，目前已经超过美国成为全球最大的牛肉进口国（表3-1），未来发展空间充足，中国需要在全球采购牛肉以满足市场缺口的需求。

表3-1 2014—2019年全球牛肉进口国家和地区牛肉进口量（千吨）

国家（地区）	2014	2015	2016	2017	2018	2019
美国	1 337	1 528	1 366	1 358	1 373	1 387
日本	739	707	719	817	835	853
中国	417	663	812	974	1 200	1 686

① 本章数据的来源如无特殊说明，均来自梅特国际集团（MIG）的肉牛行业研究报告。

(续)

国家(地区)	2014	2015	2016	2017	2018	2019
中国香港	646	339	453	543	560	356
韩国	392	414	513	531	560	550
俄罗斯	932	622	524	516	495	401
欧盟	372	363	368	338	370	341
埃及	270	360	340	250	300	340
智利	241	245	298	281	310	347
加拿大	272	269	243	229	240	204
墨西哥	206	175	188	196	210	189
其他	2 085	1 969	1 880	1 920	1 927	1 675
总计	7 909	7 654	7 704	7 953	8 380	8 329

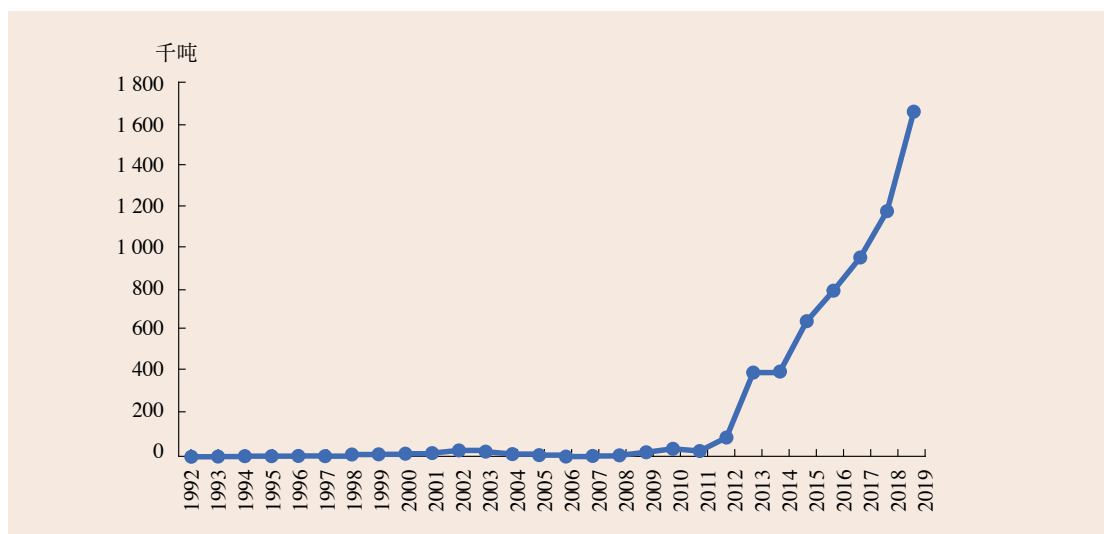


图 3-1 1992—2019年中国牛肉进口量

3.2 进口市场特点

3.2.1 发展历史和趋势

中国进口牛肉市场自2012年快速增长以来，经历了三个阶段：

(1) 红利期。2012—2014年，国际牛肉价格较低，进口牛肉在中国拥有高额的利润，大量进口商开始从海外采购进口牛肉，中国进口牛肉快速增长的步伐由此迈开。

(2) 竞争期。2015—2016年，受到进口牛肉红利刺激，大量企业参与进口牛肉贸易，造成进口牛肉短期的供大于求，市场红利被压缩，中国市场的进口商被洗牌。

(3) 稳定期。2017年之后，市场毛利率逐渐被锁定，进口牛肉的利润由于充分竞争被压缩到一个合理的范围（毛利率3%~5%），因此进口商的盈利状况受到市场行情影响较大，大规模的进口商凭借规模优势开始获取稳定的贸易利润。

3.2.2 牛肉主要供应国集中

中国最主要的牛肉供应国包括巴西、阿根廷、乌拉圭、澳大利亚、新西兰和加拿大，共占中国牛肉总进口量的97%（表3-2）。与此同时，中国仍然在不断开放新的进口牛肉采购渠道，如哥斯达黎加、爱尔兰、墨西哥、南非、白俄罗斯、美国等。

表3-2 2019年中国进口牛肉市场主要供应国及供应量

国家	进口量（吨）	占比（%）
巴西	399 462	24
阿根廷	375 538	22
乌拉圭	314 159	19
澳大利亚	297 530	18
新西兰	221 258	13
加拿大	14 640	1
其他	63 710	4

中国主要的草饲牛肉供应国大部分来自南美洲，而谷饲牛肉则多数来自大洋洲和北美洲（图3-2）。中国的牛肉加工工艺非常成熟，中国更愿意采购价格便宜的草饲原料级牛肉进行深加工或者进入中式的餐饮渠道，因而中国从南美洲进口的比例达到了60%以上。



图3-2 中国进口的主要牛肉品种

3.2.3 牛肉主要进口商集中度高

中国的牛肉进口商集中度较高，其中约54%的采购量由排名前20位的进口商完成（表3-3）。由于中国贸易金融非常发达，在这些进口商中，有很大一部分是通过金融手段帮助真正的使用者采购牛肉。大型的进口商一般会 and 比较成熟的主产区国家（新西兰、乌拉圭、巴西、澳大利亚）合作，方便大规模的贸易和获取规模优势。而小国家的进口商一般会与规模中等的进口商进行合作，帮助他们进行品牌推广以及精细化营销。在当前进口规模不断扩大的行业背景下，未来中国的进口商可能将越来越集中，以进一步加强采购者全球议价能力。

表 3-3 中国牛肉市场主要进口商一览

进口商	占比 (%)	类别
优合集团食品(马鞍山)有限公司	12.50	代理
中粮家佳康食品营销(天津)有限公司	5.10	进口商
百佑佳食品贸易(北京)有限公司	3.90	进口商
上海云象供应链管理有限公司	3.70	进口商
青岛中和盛杰食品有限公司	3.10	进口商
青岛中鹏贸达进出口有限公司	2.70	进口商
北京二商大红门肉类食品有限公司贸易分公司	2.50	进口商
江苏海企长城股份有限公司	2.20	代理
重庆商社进出口贸易有限公司	2.10	进口商
优合集团有限公司	1.90	代理
青岛联合华通贸易有限公司	1.90	进口商
上海伊禾食品国际贸易有限公司	1.70	进口商
上海牧仙神牛食品发展有限公司	1.60	进口商
黑龙江大庄园肉业有限公司	1.50	进口商
浙江惠灵对外贸易有限责任公司	1.50	进口商
重庆锦上旭国际贸易有限责任公司	1.40	进口商
悦达现代供应链管理有限公司	1.40	进口商
齐鲁交通青岛保税港区发展有限公司	1.30	代理
青岛港怡之航公用型保税仓库	1.10	代理
山东诺德英物流有限公司	0.90	代理

3.2.4 牛肉主要进口品种规格

中国牛肉消费刚刚起步,对于高端牛肉的需求相对较小,成本因素是中国市场考虑的重要因素之一,中国采购的牛肉集中在适合深加工和中式餐饮的部位。当前南美国家进驻中国市场的主要策略是生产适合加工厂使用的大块牛肉,以较低的成本进入中国。一般而言,加工厂的用量规模较大,为1 000 ~ 5 000吨/年,符合屠宰场高周转的需求。除此之外,还应当注意到牛排等部位餐饮的用量太小,难以被迅速消化,但实则有一定的利润空间。

表 3-4 中国牛肉市场主要进口品种规格

产品名称	进口数量 (吨)	CIF 价格 (美元/千克)	渠道
牛前 (80% ~ 90%瘦肉率)	5 320	4.1	火锅、深加工
胸肉	3 252	4.3	火锅
牛霖	2 237	5.0	深加工
65%碎肉	1 873	2.3	火锅、深加工
前后牛腱	1 433	5.2	餐馆、家庭
西冷	1 382	6.8	餐馆、家庭
大米龙	1 186	5.5	深加工、餐馆

(续)

产品名称	进口数量 (吨)	CIF 价格 (美元/千克)	渠道
牛腩	1 143	3.9	餐馆、家庭
上脑肩肉	1 042	5.7	餐馆、家庭
臀腰肉	883	5.5	深加工、餐馆
板腱	795	7.0	深加工、餐馆
上脑心	730	6.2	深加工、餐馆
眼肉	603	7.0	餐馆、家庭
脖肉	474	4.0	深加工
肋排	408	7.5	餐馆、家庭
肩肉	305	5.7	深加工
嫩肩肉	273	5.5	餐馆、家庭
臀肉	262	6.0	深加工、餐馆
牛柳	124	9.7	深加工、餐馆、家庭

3.2.5 扩大牛肉供给的新模式

为扩大国内市场的牛肉供应，除了直接进口牛肉，中国相关企业和机构“走出去”开启供给新模式。

(1) 购买海外工厂。中国不断有企业前往澳大利亚和南美洲收购一些屠宰场，以保证获得稳定且低价的牛肉来源。

(2) 入股海外工厂。中国的一些进口商会采用参股的形式帮助海外的屠宰场扩建产能，进而获得新的产能所带来的稳定订单。

(3) 收购牧场。一些进口商为了获得稳定的货源，会选择在海外购买牧场和育肥厂，收购活牛，再通过代加工工厂屠宰出口至中国。

(4) 自建工厂。这种情况多发生在较小的供应国家，例如蒙古国和南非。这些国家的牛肉屠宰加工工艺落后于中国本土，人力成本和建设成本较低并且能获得当地政府和中国政府的支持。中国的进口商带领技术人员前往建设工厂，应用中国的先进工艺、按照适宜的规格生产符合中国市场的产品。

3.2.6 国际牛肉产能

牛肉是发展相对平缓的畜牧资源，受自然禀赋影响较大，生长周期较长，无法通过技术或其他手段短时间对产能造成大的影响，资源相对有限，因此价值也相对其他动物蛋白更加稳定。育肥肉牛品种主要考虑其适应生产的肉质。全球主要出口国的产品主要为草饲和谷饲的牛种区别。草饲品种肉牛有较高存活率，抗病能力和抗旱能力强，可降低育肥成本，典型代表为婆罗门。谷饲品种肉牛能有效将谷物转化为大理石花纹，产生高端雪花牛肉，在肋排部位拥有较高水平产出，且仍在不断升级当中，典型代表为安格斯。因而育肥成本较高的谷饲品种其产品溢价高，适合发达国家中高端市场。

全球牛肉产能在持续增长，从2014年开始，全球牛肉产能进入一个新的上升周期。牛肉产能前三位为美国、巴西、欧盟，中国排名第四（表3-5）。美国作为全球最大产能国，一方面出口一些高价值的部位肉，另一方面大量进口碎肉满足国内的汉堡市场需求。巴西

本土的牛肉消费量极高，达到产能的80%，20%用于出口，但它仍然是全球主要的牛肉出口国。在未来美国和巴西的产能将会上升，并增加出口。中国在未来几年会持续稳定全球最大买家地位，并加强在全球牛肉贸易中的话语权。

表 3-5 2014—2019 年全球牛肉产能（千吨）

国家（地区）	2014	2015	2016	2017	2018	2019
美国	11 075	10 817	11 507	11 943	12 286	12 384
巴西	9 723	9 425	9 284	9 550	9 900	10 200
欧盟	7 443	7 684	7 880	7 863	7 915	7 878
中国	6 890	6 700	7 000	7 260	7 325	6 670
印度	4 100	4 100	4 200	4 250	4 300	4 270
阿根廷	2 700	2 720	2 650	2 840	2 950	3 125
澳大利亚	2 595	2 547	2 125	2 149	2 300	2 432
墨西哥	1 827	1 850	1 879	1 925	1 960	2 030
巴基斯坦	1 685	1 710	1 750	1 780	1 800	1 820
土耳其	1 245	1 423	1 484	1 399	1 400	1 374
俄罗斯	1 375	1 355	1 335	1 336	1 340	1 342
其他	10 156	9 379	9 384	9 329	9 402	8 117
总计	60 814	59 710	60 478	61 624	62 878	61 642

3.3 准入条件

3.3.1 必要条件

（1）拥有符合中国海关认证的屠宰工厂。中国对各个国家实行的是准入制。中国海关拥有一份标注了各个国家符合进入中国市场条件的牛肉生产加工厂商名单。名单以外的企业则无法获得中国海关的认可，从而无法进入中国。其中对于中国海关认证的屠宰工厂的基本要求为出口国的 OIE 报告显示两年内无疫情，并且符合中国肉类检验检疫的质量要求；出口国需为产品提供原产地证书且配备专门的兽医为出口产品签发卫生证。

（2）执行的具体过程。①出口国向中国海关提交正式的肉类产品出口申请。如果该国的动物健康状况达到要求，海关总署通过提交关于申请国的卫生和植物检疫（SPS）控制和检查系统的调查问卷来启动该过程。②出口国提供相应的技术文件，包括法律法规、兽医卫生服务结构、质量管理控制系统、动物疫情检测和监测、废弃物管理等。③中国海关对出口国当局提交的文件进行分析和风险评估。如果文件可以接受，则会派出专家代表团到出口国进行进一步的现场调查。④两国开展双边“卫生和植物检疫高级别对话”，就“出口到中国的肉类兽医和健康要求议定书”以及“出口健康证书”的格式进行谈判。

（3）协议标准内容中主要规定。①出口管理部门向中国海关提供影响加工厂和疾病控制系统的管理规定和程序。②出口管理部门正式确认该国是一个无流行病的地区。③出口管理部门确保可追溯性（所有肉类产品需要来自出口国）和针对特定疾病的保护。④中国

认证认可监督管理委员会（CNCA）关于出口设施注册的详细信息。⑤出口国官方兽医将履行的详细职能（宰前和胴体检疫以及检验和认证）。⑥要求屠宰和加工厂只能操作符合要求的肉制品。冷库内应该有专门的存储区域用于出口到中国的产品。⑦包装条件，如标签和标记。⑧运输、储存和操作条件（储存温度）。⑨每个容器随附的出口健康证书的详细信息。出口方应向中国海关提供授权颁发健康证书的兽医签名。⑩必须通知中国海关任何传染性或传染性事件，并立即停止出口。出口国当局必须与中国海关密切合作，以恢复受影响产品的出口。

3.3.2 成本要求

牛肉在中国已具备类大宗产品的属性，在完全竞争的状态下低成本是最快获得竞争优势的方式。中国进口牛肉的平均到岸价（CIF 价格）为4.5美元/千克，主要在4.3 ~ 4.9美元/千克价格区间，这说明中国仍然是成本导向型的偏好原料级草饲牛肉的市场，符合该价格区间的牛肉产品在中国市场能够获得认可。不同部位的需求价格参见表3-6，符合表格中中国对产品的平均需求价格将有可能在中国市场迅速获得竞争优势。

表3-6 中国偏好采购产品清单

产品	产量（吨）			到中国的平均 CIF 价（美元/千克）		
	2019年1月	2018年11月	变动率（%）	2019年1月	2018年11月	变动率（%）
牛前/后腱	13 685	13 857	-1	5.9	5.0	18
胸肉	7 901	8 131	-3	5.4	5.1	6
牛腩	6 373	5 738	11	4.0	4.0	-1
肩肉	10 919	6 702	63	4.5	4.4	2
碎肉	4 218	6 013	-30	3.3	3.1	6
牛霖	5 267	5 354	-2	4.9	4.8	0
脖肉	4 436	4 030	10	4.4	4.3	2
牛前（80%~90%瘦肉率）	3 893	4 237	-8	3.7	3.7	0
大米龙	2 641	2 899	-9	5.0	4.9	1
上脑	4 024	3 016	33	4.4	4.8	-8
西冷	2 473	2 820	-12	—	—	—
眼肉	2 632	2 212	19	—	—	—
臀腰肉	1 284	909	41	4.9	5.2	-6
小米龙	1 213	1 188	2	5.9	6.0	-2

3.3.3 质量要求

中国牛肉消费市场中，家庭零售采购食用占比较小，大部分通过餐饮、深加工之后到达消费者。其中原料级采购集中，产品价值低，加工工艺可使其迅速适应产品价格变动，对价格敏感；餐饮级采购分散，产品价值高，定价体系相对复杂，近年来采购比重在逐年攀升，家庭消费占比也在增长中（表3-7）。

表3-7 进口牛肉品类详情

进口牛肉分类	特点	部位	产地	中国进口占比 (%)	渠道类举
原料级 	大包装，低成本，高生产效率，多用于加工厂进行深加工后进入市场，产能较大，标准较统一，对成本敏感	碎肉、牛前、腱子、脐橙板、牛霖、脖肉、前后胸等	产地以南美洲、印度为主	77	平遥牛肉、牛头牌、三林熟食、紫燕
餐饮级 	精细包装，高成本，低生产效率，多用于家庭消费、餐饮、零售等渠道，可以直接用于烹饪的部位和级别包括谷饲级别、安格斯系列、和牛产品以及草饲的高端系列	西冷、眼肉、上脑、臀腰、牛仔骨、牛柳等	产地以北美洲、欧洲、大洋洲为主	23	王品、高端酒店、日韩烧烤

澳大利亚、美国、加拿大的充足供应使得中国餐饮级的供应饱和，中国在餐饮级产品上难以给出更多的溢价。同时乌拉圭和阿根廷也在培育自己的餐饮级牛群，在餐饮及市场上将会面对较大的竞争。

3.3.4 市场比较

中国主要的牛肉进口国在中国市场采取了差异化的市场策略。美国和加拿大一直代表优质稳定和标准的谷饲牛肉产品，凭借高标准的分割工艺和评级制度深受中国餐饮市场的认可。澳大利亚可以提供丰富的品种和稳定的质量，其餐饮级和原料级产品都在中国获得稳定的市场渠道，并且在市场层面通过强大的推广能力，深度营销澳大利亚的国家品牌。南美洲的国家重点通过成本优势以及灵活的加工工艺，不断为中国客户改变自己的加工方式，开发更多适合中国加工厂使用的原料级产品，保持稳定的供应能力，从而扩大对中国市场的影响力。

3.3.5 案例：蒙古国肉类进入中国

蒙古国牛肉和羊肉产品于2015年开始进入中国，以其低廉的价格和自然的品质获得中国市场认可，迅速吸引了大量中国进口商。蒙古国低廉的土地和人工成本吸引了数十家中国的中小型进口商前往蒙古国投资和收购肉类工厂，并且获得了中国的准入许可，生产牛肉、羊肉和马肉。

2015年末由于小反刍疫情导致中国关闭蒙古国的牛羊肉进口权限。中国商人投资的工厂仍然在继续运作，并迅速转型制作熟的牛羊肉向中国出口（熟的牛羊肉仍然被许可）。当前蒙古国成为最大的熟制牛羊肉出口国，也是中国唯一同时也是最大的马肉出口国。

从案例中可以借鉴：①低廉的土地、优惠的政策以及较低的劳工成本可以吸引中国商人前去投资建厂，创造当地就业。②动物疫情的控制以及与中国政府关系将会是决定出口中国市场的关键因素。③具有成本优势的肉类产品在中国市场总是存在需求空间。

4 埃塞肉牛产业价值链实地调研

FECC与ATA经过几个月的联合筹备,2019年5月5—17日,FECC组织了22人的调研团赴埃塞进行实地调研,成员包括农业政策、农业经济、肉牛品种繁育、饲料育肥、市场等领域的专家,疫苗、饲料、屠宰加工、牛副产品加工等领域的企业代表,对埃塞农业投资有浓厚兴趣的驻埃塞中资企业代表。调研活动还得到了联合国贸易中心(ITC)非洲投资与增长合作伙伴(PIGA)项目的积极支持。

调研团与ATA密切配合,在埃塞期间密集开展了近40场调研活动。调研团对埃塞农业部、贸易与工业部、投资委员会等相关部门,国家基因育种中心等科研机构,肉类生产和出口协会等行业组织,银行、国际航运公司、世界银行、盖茨基金会驻埃塞办公室等相关机构和国际组织进行了深度访谈,实地考察了印度阿兰娜(Allana)和南非韦尔达(Verde)2家外资肉牛屠宰、肥育企业以及1个综合农业产业园区,实地走访了肉牛养殖户、饲料厂、大中型育肥场、大中型屠宰场、肉牛交易市场等价值链重要环节。团组还拜会了中国驻埃塞使馆经商处,与长期驻埃塞的中资企业进行了深度交流。

埃塞政府对本次调研给予高度重视和支持。调研团到访期间,埃塞农业部部长和国务部长亲自听取了专家关于中国肉牛价值链发展经验、中国牛肉消费需求与市场发展情况的介绍;分管畜牧的农业部副部长向调研团介绍了其兽医体系和疾病防控情况。他们均表示希望学习中国肉牛产业发展经验,开展技术、能力建设和投资等广泛合作。埃塞投资委员会委员长亲自向调研团介绍埃塞外商投资政策,表示将积极给予政策支持(图4-1)。



图4-1 埃塞农业部部长、埃塞投资委员会委员长分别会见调研团

通过调研,调研团深入了解了埃塞的肉牛品种繁育、饲料、疫苗、育肥、屠宰、加工、出口等价值链主要环节的发展现状以及埃塞的营商环境,收集了丰富的一手资料。

4.1 宏观支持

埃塞政府对肉牛产业价值链发展给予高度期待和积极支持。据介绍,埃塞在前几年主要聚焦在牛副产品比如皮革的加工,在本届总理阿比上任后更多地聚焦于畜牧的生产方

面。埃塞牛存栏量大，但牛肉产量低、质量面临挑战。如果能解决这些挑战，埃塞将发挥出巨大的潜力。埃塞政府通过GTP II、全国畜牧业发展计划等进行总体规划，希望通过先进的科技、适宜的品种、市场导向的生产来开发畜牧业潜力，大幅提升畜牧产品在全球的竞争力，到2025年之前成为在非洲排名第一的畜牧出口国。

埃塞政府认为市场对于发展肉牛产业至关重要，中国是非常大的需求市场，也是埃塞致力于出口的市场，埃塞迫切希望提高出口牛肉到中国的能力。

埃塞农业部负责畜牧业务的部门包含质检检疫监控、疫苗防控、肉品出口、兽医的公共健康、追踪溯源六个部分，人员240人，与政府各个部门、非政府组织（NGO）、私营部门等开展合作。农业部负责制定战略，开展疾病防控、动物健康、进出口检测、质检以及给出口屠宰场资质认证等。联邦兽医服务主要是颁布法规、颁发证书、认证。地区级兽医服务负责落实相关的政策，如一些可以跨境传播的疾病，地区级的兽医服务需阻止这类疾病的传播。埃塞已初步建立了动物识别和追溯体系（LITS）建设、检验检疫和认证体系。埃塞政府高度重视检验检疫问题，也希望能和中方一起合作解决。为了促进出口，埃塞政府拟建设无疫区，并鼓励外资进入疫病防控领域。

埃塞肉牛产业价值链上的相关行业协会和机构也较活跃。比如饲料工业协会有80家会员，包含各种规模的饲料厂，以及设备进口商和畜牧场。肉类生产和出口协会有13家会员，基本涵盖了所有大型肉类出口企业。活畜出口协会有50家会员，为活畜生产、物流、市场提供服务。关注农业食品安全的国际非政府组织国际发展合作协会（ACDI VOCA），于2009年开始在埃塞设立饲料项目，研究埃塞的畜牧饲料的资源和发展，进行饲料生产和育肥管理培训。

埃塞的相关科研机构具备一定基础。如埃塞遗传改良中心领导和协调国家畜牧遗传改良政策、战略和方案，并与相关联邦和区域机构及私营部门协调配合，推广国家育种改良计划，同时致力于研究和教学；埃塞农业科学院目前有12个国家级畜牧研究所，包括3个专门研究红肉的研究所，其红肉研究正在制定生产标准；肉牛研究方面瞄准选种育种、出栏体重。埃塞共有15所大学设立了动物健康相关专业，如亚的斯大学设有兽医学院，还包含动物生产、动物健康学科。

4.2 品种繁育

埃塞约有27个本地品种牛，包括两用牛和肉牛，前者常具有多种用途，如劳动、产奶、产肉，耐旱，拥有较好的生存能力，但体型小、生长速度慢，这些特性均与其长期作为役用牛的役用性能有关。最主要的品种为博朗牛，体型相对较大。从实地考察了解到，本地品种牛在较好的营养条件下可以达到0.7 ~ 1千克/天，宰前体重一般为250 ~ 300千克。

也有被访者介绍，乳肉兼用的博朗种牛，体重最重可达到600 ~ 650千克。实地调研也发现交易市场存在大体型的杂交牛种，图4-2是在首都附近的大型交易市场上拍到的牛，右图是本地牛和弗拉维和牛的杂交牛，在2019年4月份完成交易，重达800千克，价格为98 000比尔（时价折合约2万元人民币）。

在现场考察的养牛农户中，牛群的品种混杂，不同品种、不同性别和不同年龄的牛只



图4-2 调研时发现的大体型牛



图4-3 放牧途中的牛群

混在一起饲养（图4-3）。不同品种之间不加选择地杂交预计会引发严重的基因流失，导致牛群生长速度和抗病能力下降，不利于实现肉牛高效生产的目的。

埃塞畜牧科研的基础目前还比较薄弱。埃塞正在建设国家动物遗传改良研究所（NAGII），开展品种改良工作；在亚的斯大学、阿瓦萨大学中均设有兽医系开展相关研究，但整体技术力量仍非常薄弱。埃塞也引进了一些奶牛，如荷斯坦-弗莱维赫牛（Holstein-Frisian）、娟珊牛（Jersey）和两用牛，如西门塔尔牛（Simmental）品种。埃塞对肉牛品种的改良起步较晚，在20年前曾经使用婆罗门牛对本地牛种进行过改良，但是效果并不是很理想，至今仍然留有当时改良所使用的冻精。人工授精（AI）技术的普及率和成功率很低，主要原因包括：投入品短缺，如液氮；冻精配送设备差且操作不当；缺乏懂得人工授精的技术人员等。

埃塞国家动物遗传改良研究所是负责埃塞全国肉牛改良的主要机构。目前其工作主要是推广国家动物育种改良计划，进口一些人工授精所需的投入品，建立动物遗传改良数据库，进行技术培训，也开展用荷斯坦牛、弗莱维赫牛、娟珊牛改良本地品种牛的工作。调研团在NAGII发现，实验设备较为陈旧，所用的冷冻精液制作设备、工具和方法等主要来自国外。当地选择优良的博朗公牛送到NAGII采精，做成冷冻精液，再发给农民做人工授

精。但是不同于奶牛，因为各种原因，人工授精在肉牛品种改良中的推广效果不佳。

调研团在Modjo一家肉牛肥育场看到，5头牛中有4头是荷斯坦-弗莱维赫牛与当地品种牛的杂交后代，相比于本地牛，杂交后代的体型增大，生长速度加快。养殖户表示，这几头杂交牛的市场价格至少是本地牛的2~3倍，希望把他们的牛都变成这样。这表明，肉牛杂交改良在当地受到养殖户欢迎。走访到的各方都迫切希望与中方开展品种繁育和改良的技术合作与能力建设。

4.3 育肥和饲料

在育肥方面，一般只有出口的牛才经过育肥场。埃塞的高地和低地畜牧管理体系差别较大。在高地饲养体系里，除了开展育肥和产奶实践的地区，其他地区基本不使用商品饲料，更多用农作物秸秆为牛作为饲料来源，或放养户外自由采食。高地牛主要作为役用，一般使用到6~7年后淘汰，供应本地牛肉市场。埃塞本地人喜欢吃生牛肉，喜欢有嚼劲的口感，与国际市场需求完全不同。本地市场上的牛肉价格很高，通常在节日还会上升，500千克的牛能卖到80 000比尔（折合约1.1万元人民币），农户一般会为此进行半年到一年的肥育。低地饲养体系里，犊牛从出生到断奶均和母牛在一起，以吮吸母乳和采食牧草为主，断奶后主要以放牧为主，基本不饲喂精饲料或者精补料，部分青年公牛供应到高地做役用牛，小部分作为架子牛被育肥场采购，供应国外市场。

用作育肥的牛一般在2岁左右，体重在110~160千克范围内，育肥场收购的价格约40比尔/千克，经过至少3个月的肥育，在270~280千克时出栏，平均屠宰率在50%左右。这些育肥牛主要供应中东市场，中东市场偏好月龄小的牛，未刻意要求体重。

目前育肥场数量有限且规模较小，高地育肥场数量少，低地育肥场较多且主要位于首都亚的斯到吉布提港沿线，主要为出口服务。一些外国投资的肥育场正在埃塞兴起，调研团走访了韦尔达肉牛围栏育肥场，该育肥场由南非投资兴建，应用了现代化肥育技术和装备，具有较大的建设规模，并应用高精料水平和莫能菌素肥育肉牛，确保在合适的时间出栏育肥牛（图4-4）。调研团还走访了多家本地育肥场，因为育肥效益可观，他们均有强烈的扩张发展愿望。

在饲料方面，作为核心原料的预混料和添加剂严重依赖进口。埃塞用于肉牛的饲料供应严重不足。据埃塞饲料工业协会估计，埃塞当前存栏肉牛所需的饲料为每年1.04亿吨，其中精料补充料占5.4%，约为562万吨。然而目前埃塞的肉牛用精料补充料实际生产量不足9 000吨，占比不到0.2%。目前埃塞饲料加工厂主要分为私营企业与农民组织两种，前者占据70%市场份额，主要以生产禽料（66%）为主，其次是奶牛料（23%）；农民组织主要生产反刍料（97.5%），其中肉牛料占56.4%，奶牛料占43.6%，将近60%（5 400吨）是由农民组织生产。肉牛饲养过程中很少采购全价料，多数育肥场采购精粗饲料自行配制全混合日粮，而规模较大的育肥场会购买预混料，而一些家庭式育肥场并不使用预混料。

目前埃塞当地粗饲料原料主要为牧草（很少苜蓿）、台麸、大麦等谷物秸秆。生产商品料的原料包括能量饲料、蛋白饲料和维生素矿物质预混料，其中，能量饲料主要有玉米、小麦麸、次粉、米糠、鹰嘴豆麸皮和糖蜜；蛋白饲料主要是油料场的副产品，包括大



图4-4 韦尔达肉牛育肥场

豆饼、棉籽饼、亚麻籽饼、瓜子仁饼和花生仁饼等，这些饲料的获取取决于谷物种植面积和油料加工业，埃塞的玉米主要种植在西北部 and 南部地区，基本都用于食物，产量根据降雨量的大小差别比较大，平均玉米单产为3.9吨/公顷，较世界玉米平均单产的5.1吨还有差距。

此外，矿物质和维生素饲料决定了育肥品质和盈利率。埃塞本地仅可生产石粉(limestone, 占反刍预混料重量的50%、价值的20%)、食盐和肉骨粉，其余维生素、矿物质和氨基酸类添加剂均无法国内生产，需要进口。目前12家进口商从5个国家进口，欧洲是其主要进口国家。

4.4 疫病防控

在疫病方面，疫病防控体系不健全，疫苗供给不足，缺少兽药，成本较高。经过多年的建设和发展，埃塞的兽医卫生系统已经初步建成，涉及检疫监控、疫苗防控、肉品出口检疫、兽医公共健康和溯源管理。尽管如此，埃塞俄比亚的疫病防控离国际标准仍有很大差距，国家疫苗机构(NVI)生产疫苗的数量、质量均不能满足防疫要求，口蹄疫、牛胸膜肺炎和布鲁氏菌病是埃塞肉牛业中最重要的三种传染性疾病。

口蹄疫(FMD)能导致犊牛的死亡和成年牛的经济损失。在全球范围内，口蹄疫病毒可以通过疫苗的定期接种来实现有效控制。调研团在NVI调研时了解到埃塞的口蹄疫有南

非Ⅱ型、O型和A型等三个血清型。根据Admassu (2015)等的研究,埃塞牛群口蹄疫阳性检出率为24.6%~44.2%,其口蹄疫血清型还包括南非Ⅰ型和SAT2型。目前,埃塞国内的口蹄疫疫苗大约有300万支的需求量,NVI可以提供约50万支,剩余大部分是靠从博茨瓦纳进口或者非政府组织的援助。埃塞政府在2019年颁布了国家口蹄疫防控条例,对用于出口的牛均进行防疫免疫,并且政府对口蹄疫疫苗实行50%的补贴政策,个体养殖户可以免费获得疫苗,私营企业需要自行购买,疫苗成本一般低于1美元/支。

牛胸膜肺炎(CBPP)是发生在非洲牛属动物上具有高度传染性的呼吸道疾病,是继非洲牛瘟后第二个重要的跨界性动物疾病。Nejash等(2017)的报告显示,随地区不同,全国牛群抽样的血清阳性率为0.4%~96%,有报告其死亡率达到24.5%。CBPP高发病率和死亡率高给埃塞许多地区的肉牛养殖造成了重大经济损失,而且还限制了活牛和牛肉产品的国际贸易。据估计,埃塞每年肉牛业因CBPP的经济损失超过896万美元(Abdela and Yune, 2017)。

布鲁氏菌病也会导致动物生产部门严重的经济损失和公共健康恶化。畜牧生产系统和环境条件都极大地影响了布鲁氏菌感染的传播。埃塞的研究人员开展了大量有关牛布鲁氏菌病流行规律的研究,如已发现传统肉牛饲养体系中的布鲁氏菌血清流行率远低于集约化饲养体系。Haileselassie (2010)等的研究表明,埃塞集约化饲养体系的发病率为7.7%~50%,平均23.3%。Teshager (2014)等的研究表明,埃塞传统饲养体系地区牛的布鲁氏菌病发病率为0.2%~22%,平均4.4%。但调研团未能查找到埃塞政府对于牛布鲁氏菌病采取的防疫措施相关资料。

结节性皮炎(LSD)是由痘病毒科(Poxviridae)羊痘病毒属(*Capripoxvirus*)病毒引起的牛传染性病毒性疾病。LSD于1981年在埃塞俄比亚首次报道,随后成为地方性流行病。Molla等(2017)的研究表明,埃塞9个州和2个直辖市地区均有该疾病流行,不同地区之间的发病率不同,在炎热干燥的低地地区发病率较低,而在温暖湿润的高原地区较高,暴发呈季节性规律,一般是每年10月发病率达到高峰,5月降为低谷。Ayelet等(2014)的研究表明,LSD在埃塞当地2174头瘤牛的发病率和死亡率分别为13.61%和4.97%。LSD的防控可以通过接种疫苗、限制动物流动和捕杀受感染和被暴露动物的方式来实现。但是,这需要足够的财力、基础设施和人力资源以及信息系统的支持。在埃塞现有条件下,还无法实施所有这些措施。因此,多年来采用疫苗接种作为控制LSD的最重要方法。但是,在西奥罗米亚地区进行的调查结果(Abera, 2019)显示,现有LSD疫苗在埃塞俄比亚的防控效果不佳。为了防控LSD疾病在肉牛群的流行,需要研究和开发针对性更强的疫苗产品。

在兽药方面,调研团了解到目前NVI正在建设化学药物生产车间,具体的生产数量未能估算。现有兽药主要通过进口获得,大部分为中国产品,也面临和疫苗一样的困境。

4.5 屠宰加工与出口

埃塞屠宰加工的产能过剩,开工不足。埃塞现有出口红肉屠宰场13家,设计年屠宰产能大于15万吨红肉(表4-1),但现在的出口量仅为2.2万吨。屠宰场为订单式生产,这也说明这些屠宰场订单不足,生产能力过剩。

表 4-1 埃塞出口牛肉屠宰场基本情况

编号	企业名称	设计年产能（吨）	备注
1	Modjo Modern	5 230	
2	Lunna	5 230	
3	Organic	4 500	
4	Abissinia	5 000	
5	Hashim	5 000	
6	Allana Akseker	6 000	
7	Halal	5 000	
8	ELFORA D	4 100	未来计划 10 000 吨
9	ELFORA M	5 000	
10	Al-Nujum	5 000	
11	Jigjiga	6 000	
12	Abergelle	6 000	
13	Allana FBF	90 000	
	总计	152 060	

调研团走访了 Frigorifico Boran Foods PLC，该公司由印度阿兰娜集团投资 6 000 多万美元于 2017 年左右建成，年屠宰能力为 100 万头牛和 300 万只羊。该公司设备先进，具备满足出口质量要求的条件。该公司生产为订单式，只有在得到牛肉订单才进行生产，如果单班生产数量少，或者不能连续生产，在启动既定的大规模产能时会产生较高的生产费用，导致加工费用过高。在走访时该公司尚未大规模开展肉牛屠宰，以肉羊屠宰为主，其实际产能不足设计产能的 10%（图 4-5）。





图4-5 印度阿兰娜集团投资的埃塞屠宰场

调研团还走访了本地投资的多家屠宰场，这些屠宰场均表示了强烈的合作意愿。但是，这些屠宰场的相应基础设施薄弱，活牛的运输设施、冷冻肉的保存设施以及屠宰加工设施普遍薄弱。对于屠宰商来说，获得稳定的牛源供应非常重要，涉及屠宰商的资金周转效率和流水线持续作业带来的规模效应。但根据实地调研结果，埃塞目前牛源较为分散，规模化育肥场较少，牛群质量不稳定，这会导致下游加工厂以及餐厅获得的牛肉成品质量不稳定，从而影响客户再次购买的信心。市场对于质量不稳定的产品的出价，会基于原料级牛肉的价格再次减值。



图4-6 埃塞活牛交易市场

另外，牛的副产品没有对应工业挖掘深度的经济价值，导致肉的成本偏高。比如牛下水，一副大概300 ~ 400 比尔，与中国的价格相比非常低廉。牛骨可以被加工为明胶，但目前屠宰规模小，牛骨收集量很小，无法支持明胶加工的规模化生产，同时明胶生产的其他辅料均需进口，导致无法充分挖掘牛骨的附加值。

4.6 营商环境

在投资管理方面，埃塞投资促进委员会（EIC）为所有外来投资者提供一站式服务，颁发投资许可证。EIC目前有250名工作人员，对每一个投资人都安排专人进行对接，提供一站式服务。EIC表示可提供各种优惠政策，如十年免税、所有进口到埃塞的机械免税、

原料进口流转税免税等。但埃塞税收体系较为复杂，需做好充分的了解，特别是在免税期也需充分了解税制并严格遵循。另外，埃塞为联邦制，联邦与地方政府对投资各有要求，埃塞民族众多，风俗各不同，需主动了解并遵循。

在工业园区管理方面，埃塞制定了工业园法，成立了工业园开发公司，提供园区内的特殊政策支持。外资企业入园后由园区开发公司负责管理。园区以出口为导向，土地租赁价格低廉，期限为60年。埃塞为农产品加工投资者制定了一系列财政鼓励政策，如所得税5年豁免、进口关税豁免和出口奖励。

埃塞正在全国各地建设十几个园区，许多由中资企业承建，调研团走访了其中的阿瓦萨工业园区，发展较成熟，管理有序（图4-7）。



图4-7 已建成使用的阿瓦萨工业园区

埃塞在建农业产业园区4个（详见附录2），调研团走访了其中的伊戈勒姆（Yirgalem）综合农业产业园区（IAIP），该园区规划完善，已完成土建约50%（图4-8）。

在土地方面，项目完成选址后，EIC将向土地委员会申请土地，或者向当地工业园区协商进入。埃塞的大部分土地为国有，EIC会根据其方案进行征地。EIC愿积极支持提供用于屠宰场和饲料的土地，可向私人企业提供补贴性土地租赁，为饲料生产分配足够的土地。埃塞法律规定，如果外来投资方在当地没有饲养场则不允许出口活畜。

在外汇方面，埃塞缺少外汇，外汇管制严格，不希望外汇回流，而是继续在埃塞投资，但也保留可向埃塞国家银行提交申请的途径。埃塞汇率存在较大波动，对项目成本可能造成较大影响。



图4-8 伊戈勒姆综合农业产业园区

在人力资源方面，埃塞人工成本低，但缺少相关技术工人。埃塞用工成本较低，2 000 ~ 4 000 比尔/月（约合300 ~ 600元人民币/月），培训过的工人离岗率较高。肉牛产业价值链上涉及诸多技术，如疫苗的分发使用、屠宰技术应用等，均缺乏相关成熟劳动力。在质量标准上，埃塞对药品的要求比较高，但是认证人员能力不足，需要从国外请进资质校验团队，可能需耗费很长时间。此外，外资企业需注意劳工关系的合理处置。

在政治环境方面，常有相关政治冲突的新闻报道，让投资者存在不稳定的担忧。

在相关投入方面，国际组织正在埃塞执行畜牧业相关项目。如世界银行正在准备一个埃塞低地游牧居民改善项目，总投资4亿美元，其中包括肉牛产业价值链建设，品种改良，建立无疫区、耳标追溯系统、畜产品市场等，希望私营部门能共同加入项目建设。

盖茨基金会等国际组织正在开展埃塞畜牧业发展促进活动，比如这几年一直在促进提高埃塞疫病防控能力，引入先进疫苗生产技术，吸引国际疫苗厂商投资，推动埃塞为养殖户提供充足且价格适宜的口蹄疫疫苗，经过多轮洽谈，已选择一家中资企业作为合作伙伴。

联合国工业发展组织正在执行中国南南合作援助基金项目“实施通过能力建设升级埃塞俄比亚畜牧业价值链项目”，该项目旨在帮助埃塞提升畜牧业发展水平、促进经济社会发展，共同推动落实联合国2030年可持续发展议程。

联合国国际贸易中心在埃塞等非洲四国执行非洲投资与增长伙伴项目（PIGA），计划利用4年时间，通过带领非洲四国投资促进和相关产业部门官员、企业家到中国开展频繁的产业投资推介活动，推动埃塞等四国的农业和轻工业发展，埃塞的畜牧业也是其中的重点领域。

在埃塞的中资企业也纷纷看好埃塞的农业发展前景。一些在埃塞的大型中资企业，承担了大量的埃塞工程建设项目，熟悉了埃塞的营商环境和发展优势，希望扩展到农业领域发展。比如中地海外集团，在埃塞政府的支持下，近年来一直在推动埃塞畜牧园区建设工作，与埃塞相关部门做了大量沟通，开展了产业的深度调研。

5 埃塞肉牛产业价值链的主要制约和成本比较

根据埃塞GTP II计划，埃塞将大幅增加红肉生产量，政府希望通过扩大出口将丰富的牛存量转换为外汇，促进国家整体发展。通过案头研究和实地调研发现，埃塞的牛存量巨大，土地、劳动力的价格具有明显的比较优势，但肉牛价值链各重点环节的发展不足制约了埃塞肉牛价值链的有效发展，牛肉品质和价格缺乏国际竞争力。本部分主要以牛肉出口为导向，分析主要优势和发展制约。

5.1 主要制约

5.1.1 农业发展整体水平限制了畜牧业的发展

受埃塞整体农业环境的制约，畜牧业发展速度缓慢。国家财政对农业投入不足，基础设施建设薄弱，农民自身的财富积累率很低，对生产过程的物资投入能力有限，缺少灌溉，缺少各种相关投入品，同时受外汇不足影响难以进口所需相关物资。这些因素综合制约了粮食、饲料和牧草的生产。同时农机化程度低，生产以畜力和人力为主，大部分牛群必须用于农业生产，未能解放出来转化为生产牛肉。

5.1.2 生育率低限制了牛肉品质和数量提升

一是生育率低导致断奶犊牛产量低。由于近亲繁殖、营养不足和缺乏管理等原因，埃塞繁殖牛群的繁殖性能很低。根据Haile等（2011）的数据，埃塞以博朗品种为主的肉牛初配年龄和产犊年龄均晚于美国和中国，甚至低于世界平均水平，而产犊间隔、日均产奶量、全期产奶量、犊牛初生重和犊牛6月龄断奶重等重要的繁殖性能指标，与美国、中国及世界平均水平有较大差距（表5-1）。

表5-1 埃塞博朗牛繁殖性能与世界主要国家肉牛的对比

	埃塞	中国	美国	世界平均
初配年龄（月龄）	33.4	20	16	24
初产年龄（月龄）	42.8	30	25	33
产犊间隔（天）	447	395	375	430
日均奶量（千克）	1.7	6.5	4.5	3.0
全期产奶量（千克）	507	806	810	450
产奶期（天）	240	124	180	150
犊牛初生重（千克）	23.3	35	36	30
6月龄断奶重（千克）	79.0	175 ~ 205	186 ~ 210	185

数据来源：埃塞的数据来自Haile等（2011），其他数据来自《中国畜牧业统计》和FAO统计数据，部分数据为估计值。

二是育肥牛增重速度慢。埃塞牛种的增重速度和屠宰体重指标与世界各国普遍应用的专用肉牛品种的日增重和屠宰体重指标相比相差1倍（图5-1和表5-2）。



图 5-1 埃塞本地博朗牛 (a) 和法国利木赞肉牛 (b)

表 5-2 世界主要国家肉牛增重速度和屠宰体重对比

	埃塞	中国	美国	巴西	世界平均
日增重 (千克)	0.3 ~ 1.0	1.2	1.5	1.4	1.0
屠宰体重 (千克)	220 ~ 350	>500	>550	450	480
平均胴体重 (千克)	110 ~ 175	301	364	251	212

三是饲料成本高昂但商业饲料需求难以实现。饲料占动物养殖成本的70%，是提高养殖效率、降低养殖成本的关键。与预计的相同，埃塞商业饲料需求大幅上升。一方面，饲料原材料价格上涨迅速，导致饲料价格上涨。埃塞谷物生产仍未实现自给自足，需进口小麦。另一方面，工业化规模养殖还处在早期发展阶段，农户后院养殖还占主流，饲料行业的发展在短期与规模化养殖的发展速度直接相关。当前，小规模饲料行业存在较大发展空间，大规模的饲料厂建设投资仍缺少投资动力。

5.1.3 牛群疫病限制了国际市场的拓展

埃塞牛群疫病是拓展更广阔国际市场的核心制约因素之一。世界动物卫生组织 (OIE) 2019年清单列出的24种多发、群发传染病中，埃塞牛群中存在口蹄疫 (foot and mouth disease, FMD)、炭疽、布鲁氏菌病 (brucellosis) 3种；在清单列出的13种牛病中，埃塞牛群中有牛传染性胸膜肺炎 (contagious bovine pleuropneumonia, CBPP)、结节性皮肤病 (lumpy skin disease, LSD) 2种。这些疾病不仅影响埃塞牛群的健康和生产性能，而且使埃塞的活牛和牛肉产品达不到OIE的相关贸易要求，直接影响与其他国家间的国际贸易。在此情形下，当下如果产品进入中国，将产生食品安全和社会发展风险。

目前，埃塞畜牧业疫病防控体系刚刚开始建立，相关法律法规、推广体系均未健全，疫病防控能力和设施建设十分薄弱，多种疫病混杂，传播途径多样，难以通过无疫区或隔离区进行有效防控，须开展全国性畜群疫病防控和净化行动，且需私营部门的协助，循序渐进推广全国免疫，才能治标且治本。

5.2 价值链重要环节成本比较

综合收集到的相关数据可以看出，埃塞在一些价值链环节上具备比较优势，但一些环节不具有竞争力。如架子牛价格、饲料成本、种植饲草饲料的土地成本、饲养人工成本、副产品价格与中国相比均具有竞争优势，饲草的增产空间大，但到育肥牛价格、出口价格以及运输环节，不具有国际竞争优势（5-3）。

表 5-3 肉牛产业价值链重要环节相关成本综合比较

比较项	埃塞			研判
1. 架子牛				
信息来源	重量（千克）	价格（比尔）	单价（比尔/千克）	
IAIP综合农业园区	260	8 000	30.77	与中国相比具有较强竞争力
韦尔达	90 ~ 150	3 500 ~ 5 800	38.64	
阿兰娜	160	6 400	40	
活畜出口协会	200	10 000	50	
LUNA 屠宰场	210	7 770	37	
Modjo 育肥场	260	12 500	48.08	
2. 饲料成本				
信息来源	价格	日增重（千克/天）	精饲料（千克/天）	
阿兰娜	40 ~ 60 比尔/头	1	—	与中国相比具有较强竞争力
LUNA 屠宰场	—	0.8 ~ 1	—	
活畜出口协会	54 比尔/天	1	10	
Modjo 育肥场	25 ~ 30 比尔/天	—	—	
3. 土地和劳动力成本				
信息来源	特点			
现场调研	土地租金非常低廉	—	—	与中国相比具有较强竞争力
现场调研	粮食作物、饲草单产低	—	—	中国具有高单产的相应品种和种植技术
活畜出口协会	临时工人 100 比尔/天	—	—	与中国相比具有较强竞争力
4. 育肥牛				
信息来源	重量（千克）	价格（比尔）	单价（比尔/千克）	
IAIP综合农业园区	350	15 000	42.86	在中国市场不具备优势
韦尔达	210 ~ 240	—	—	
阿兰娜	270 ~ 280	—	—	
亚迪斯活牛市场	一类 500，另一类 250 ~ 300	一类 25 000 ~ 30 000，另一类 17 000 以上	一类 50 ~ 60，另一类 57 以上	

(续)

信息来源	重量（千克）	价格（比尔）	单价（比尔/千克）	
活畜出口协会	250 ~ 350	18 900	54	在中国市场不具备优势
Al-Nujum 屠宰场	220 ~ 300	—	—	
LUNA 屠宰场	300	—	—	
Modjo 育肥场	500 ~ 600	30 000	50 ~ 60	
说明	500 千克以上的牛用于祭祀或者特殊活动，外来牛和本地牛杂交的牛，因为体重大，一般超过500 千克，售价相对较高。例如，3 岁龄 500 千克售价 60 000 比尔。			
5. 牛肉价格				
信息来源	出口（比尔/千克）	本地（比尔/千克）		
韦尔达	120	—		在中国进口市场不具备优势
亚迪斯肉铺	—	170 ~ 240		
埃塞活畜出口协会	108	270		
6. 屠宰率和出肉率				
信息来源	屠宰率（%）	出肉率（%）		
IAIP 综合农业园区	44	34		
阿兰娜	50	40		
Al-Nujum 屠宰场	55	41		
埃塞活畜出口协会	50	—		
7. 副产品				
类别	价格	说明		
牛下水	14 美元/副	不含皮		具有竞争力
皮张	10 美元/张	300 千克活重		具有竞争力
8. 运输				
冷藏集装箱运费	9 000 美元双程计价（从亚的斯到吉布提港口）	如果足够的货运量，也可协议单程运费		不具有竞争力

数据来源: 根据调研团走访期间收集的数据整理, 竞争力比较由专家组共同研判。

5.3 经济比模型分析

根据表 5-3 在调研中收集到的数据, 设置关键假设条件 (表 5-4), 假设:

- (1) 从养牛户中收购的活牛单价为 42.8 比尔/千克, 体重为 160 千克;
- (2) 经过育肥后, 出售价为 72.1 比尔/千克 (2.5 美元/千克), 体重为 280 千克;
- (3) 屠宰率为 50%, 出肉率为 75%;
- (4) 牛肉价为 120 比尔/千克 (4.1 美元/千克);
- (5) 副产品售价为 14 美元/副, 牛皮为 10 美元/张。

表 5-4 肉牛育肥场和屠宰场的关键假设

项目名称	重量 (千克)	出售单价 (比尔/千克)	出售总价 (比尔/千克)	出售单价 (美元/千克)	出售总价 (美元/千克)
育肥前体重	160	42.8	6 848	1.5	236
育肥后体重	280	72.1	20 188	2.5	696
胴体重 (屠宰率为50%)	140	86.4	12 096	3.0	417
净肉重 (出肉率为75%)	105	120	12 600	4.1	434
骨重	35	5.4	189	0.2	7
副产品重 (不含皮)	110	3.8	418	0.1	14
牛皮 (1张)		297	297	10	10

注：汇率按当时价1：29。

根据以上假设，育肥场的毛利润率可达到43%，但屠宰场则处于严重亏损状态，毛利润率为51.3%，每头牛亏224美元（表5-5）。此时育肥牛成交价格约2.5美元/千克，而澳大利亚活牛平均出口价格在2.0～2.3美元/千克，同时澳大利亚的活牛质量远高于埃塞。在没有获得质量优势的前提下，成本高于澳大利亚活牛，这导致了之后的牛肉生产经济比下降。屠宰商以这个价格收购的活牛很难在国际市场上获得竞争优势。尤其是原料级市场，埃塞高昂的活牛价格导致屠宰场巨大的亏损。

表 5-5 埃塞当前肉牛育肥场和屠宰场经济比

类别	金额	
	比尔/头	美元/头
育肥场 经济比		
成本	11 648	402
架子牛成本	6 848	236
育肥成本 (40 比尔/天, 120 天)	4 800	166
收入	20 188	696
毛利润	8 540	294
毛利润率	42.3%	
屠宰场 经济比		
成本	20 431	705
活牛成本	20 188	696
屠宰包装	243	8
收入	13 504	466
肉的销售	12 600	434
骨的销售	189	7
副产品	715	25
毛利润	-6 927	-239
毛利润率	-51.3%	

根据分析模型假设，埃塞肉牛生产需要达到如下指标要求方可实现盈利：

在育肥场和屠宰场独立运营模式下：①每头牛每天的育肥成本需要从40比尔降低至30比尔。②育肥场降低活牛出售价降至2美元/千克，与国际活牛价格一致，将利润让渡给屠宰场，此时育肥场毛利润率仍能达到35.7%。③屠宰场开发副产品价值尤其是牛皮，使副产品综合收益达到128美元/头。综合以上，屠宰场可以保持不亏损（表5-6）。

表 5-6 埃塞肉牛可盈利的屠宰经济比（育肥场和屠宰场相独立）

类别	金额	
	比尔/头	美元/头
育肥场 经济比		
成本	10 448	360
架子牛成本	6 848	236
育肥成本（30 比尔/天，120 天）	3 600	124
收入	16 240	560
毛利润（收入－育肥成本）	5 792	200
毛利润率（毛利润/收入）	35.7%	
屠宰场 经济比		
成本	16 483	568
活牛成本（即育肥成本）	16 240	560
屠宰包装	243	8
收入	16 507	569
肉的销售	12 600	434
骨的销售	189	7
副产品	3 718	128
毛利润（收入－成本）	24	1
毛利润率（毛利润/收入）	0.1%	

在育肥场和屠宰场一体化运营模式下，活牛价格即为育肥成本价格加屠宰包装价格，大幅降低了屠宰企业成本，则屠宰场毛利润率可以达到11.9%（表5-7）。如此时再综合其他措施，降低育肥成本至30 比尔/天，副产品收入增长至128美元/副，则育肥场的毛利润率可达到35.2%。

表 5-7 埃塞肉牛可盈利的屠宰经济比（育肥场和屠宰场一体化）

类别	金额	
	比尔/头	美元/头
育肥场 经济比		
成本	11 891	410
架子牛成本	6 848	236

(续)

类别	金额	
	比尔/头	美元/头
育肥成本 (40 比尔/天, 120 天)	4 800	166
屠宰包装	243	8
收入	13 504	466
肉的销售	12 600	434
骨的销售	189	7
副产品	715	25
毛利润 (收入-成本)	1 613	56
毛利润率 (毛利润/收入)	11.9%	

需要说明的是, 以上计算基于假设条件, 未包含假设以外的成本, 如防疫、运输、贮藏等, 仅供参考。

5.4 埃塞牛肉出口的竞争力评估

5.4.1 进入中国牛肉市场的评估

就各国多方面的对比关系来说, 埃塞存在增长潜力, 但是当前条件较差, 进入国际市场或者中国市场处于竞争劣势 (表 5-8)。

表 5-8 埃塞与主要牛肉出口地区的相关要素比较

分析点	北美洲	南美洲	澳大利亚	埃塞
政治环境	优	一般	优	一般
牛群质量	优	一般	优	低
牛肉出口价格	高	低	中	低
产能	高	高	中	低
出口量	高	高	高	低
本土消费	中	高	低	低
资产溢价	高	低	中	低
经营难度	低	高	中	高
并购机会	较少	多	少	多
劳工势力	较强	强	弱	弱
与中国的关系	紧张	稳定	一般	稳定

从价格来看, 埃塞并没有太大优势, 同时较低的牛群质量让埃塞很难和南美洲国家竞争在中国的市场份额。中国市场对牛肉的需求是多元化的, 目前中国 80% 以上的牛肉需求为原料级牛肉。埃塞牛肉 4.5 美元/千克的出口价格, 目前与埃塞竞争较为激烈的产地是南美洲和印度。中国是乌拉圭最大的买家, 平均输华价格为 3.5 美元/千克; 同时巴西是中国最大的牛肉供应国, 去骨牛肉输华价格平均为 4.6 美元/千克, 即中国对于原料级牛肉的接

受价格在3.5 ~ 4.6美元/千克。

在运输方面，高昂的运输成本也制约了埃塞的牛肉竞争优势。目前埃塞的唯一出海口在吉布提，往返运输成本在9 000美元/整箱货（FCL），约合0.36美元/千克；高昂的物流成本可能使埃塞的牛肉CIF价格达到4.9 ~ 5.0美元。如何降低埃塞的出口费用以及物流成本也同样是需要解决的关键问题。目前根据调研情况，稳定的出口量可以降低50%左右的物流成本，仍然有0.2美元/千克的物流成本需要压缩屠宰场和出口商的利润空间。

根据调研团分析预测，埃塞最终可以输华的牛肉价格在4.8美元/千克，并且目前存在这种输华的能力条件。但是在质量和价格均没有竞争优势的情况下，在中国市场难以取得成功和盈利。

5.4.2 进入中东牛肉市场的评估

2015—2019年中东的牛肉进口量比较平稳，保持在107万 ~ 115万吨，没有出现很大的增长，说明市场已经较为饱和，很难获得增量市场。

中东市场主要的供应地区是北美洲、南美洲。截至2019年7月，牛肉进口量在100万吨左右，其中美国11万吨、南美洲34万吨、印度20万吨、其余国家35万吨。这说明中东地区的采购商仍集中在低端牛肉。埃塞如果进入中东市场，需要面对全球低端牛肉主要供应国的强势竞争，在没有增量市场的情况下，需要具备成本优势。如果埃塞在产能上能够提高，降低养殖成本，使得价格与南美洲相比具备竞争力，则有机会占有中东市场上来自南美洲的市场份额。

6 中国-埃塞肉牛产业价值链合作建议

6.1 合作目标

双方合作将致力于推动埃塞发展健康且具有竞争力的肉牛产业价值链，降低疫病风险、控制生产成本、提高牛肉品质，充分发挥比较优势，扩大出口创汇，促进小农户提高收入，推动畜牧业和大农业的可持续发展。

6.2 合作基础

一是保持宏观营商环境稳定并不断优化。保持政局稳定性、政策的连贯性，对于投资的企业给予长期稳定的政策承诺，例如地价及优惠政策，在土地和价格、税收种类和税率、人力资本等方面保持比较优势和一定时期的稳定性，对国内外企业一视同仁。

二是引入相关公共和国际资源共同支持肉牛价值链。引入埃塞公共和国际资源，如世界银行、盖茨基金会、联合国工业发展组织、非洲绿色联盟等，对支持价值链合作具有重要意义。

三是设计合理的风险规避措施。埃塞一直存在外汇短缺的问题，尤其在美元加息和大宗商品价格下跌的背景下，埃塞外汇市场会承压严重。如果埃塞本币大幅贬值，对外资企业的原材料进口、生产运营、收益回流等均会产生较大的影响，将直接体现为加大财务报表中的汇兑损失，直接侵蚀企业的经营利润，使企业持续运营陷入困境。

6.3 合作路径

6.3.1 全方位推动知识合作，开展能力建设

全方位开展肉牛产业价值链关键环节的知识分享、经验交流和技术交流。第一是疫病防控体系和机制建设的知识分享与技术交流。分享中国对于疫情控制的目标和需求，交流中国疫病防控体系建设、检验检疫经验。第二是价值链政策体系建设知识分享。中国40年前的肉牛产业价值链与埃塞非常相似，中国可分享相关产业政策演变、机制架构、产业发展模式，同时也可分享中国如何推动传统农业转型为现代农业、如何发展农机替代畜力等农业发展经验。第三是品种繁育、饲养和育肥的知识分享和技术交流。重点围绕肉牛品种选育、遗传材料利用、预混合饲料原料引进、疫苗生产和原料药进口等重点领域，在肉牛良种繁殖、疫病防控、饲料饲养、围栏育肥、屠宰加工、市场营销等关键环节，开展共同研发、技术培训与科研成果示范，并集中展示先进技术与优良品种，与埃塞肉牛产业价值链的利益相关者分享先进的技术、经验与成果。第四是分享中国牛肉市场的供给需求信息。分享和交流牛肉屠宰分割标准、电商平台与多种市场机制结合推动牛肉消费市场快速增长的经验。

探索多种形式的能力建设，实现知识分享。通过多种形式为埃塞政策制定者、行业协会、科研人员、私营部门等相关利益群体提供能力建设平台。推动中国发展援助资源、吸引国际组织资源、结合有投资意愿的私营部门，共同培养埃塞肉牛产业价值链的相关人

才，促进建立埃塞肉牛产业价值链新技术、新模式和新业态。建议在中国和埃塞轮流举办肉牛产业价值链技术培训班、学术研讨交流会；在双方政府框架下交换留学生，派出相关技术援助专家；定期举办学生、学者和企业家的产业技术交流会和技术考察活动。

6.3.2 疫苗先行，兽药跟进

建议高度重视并解决疫情防控问题，争取早日达到OIE报告两年内无疫情的要求，进而获得中国等更广大国际市场的认可。

分享和学习中国疫病控制经验，鼓励外资进驻疫苗生产和防疫领域。吸引外资开展疫苗本地化生产，打破现有的不良循环，减小对外汇的依赖性，通过疫病的阶段性进展推动全国免疫。建议在兽药及疫苗的零售领域也实现对外资的开放，推动外资企业与本地管理部门共同合作，加强免疫网络的建设，更好掌握疫病规律周期。

中国的大型疫苗企业具备丰富的疫病防控经验和技能，具备海外合作的内生动力，可与盖茨基金会、埃塞政府联合开展私营部门-公共部门-慈善机构共同合作模式（PPPP）。在推广疫苗的同时，建议引入中国的相关兽药技术和产品，利用相同的推广体系，与疫苗一起共同发挥积极的防控作用，支持埃塞早日实现OIE的两年无疫情要求，为拓展更广阔的国际市场奠定坚实基础。

在疫苗和兽药的产业合作中，也建议密切结合埃塞方现有的公共投入和国际组织相关资源，在细分产业领域里实现价值链的合作，实现可持续发展。

6.3.3 发展育肥—屠宰一体化模式试点

合作经营目标集中在肉牛的规模化繁育和降低成本。埃塞丰富的牛源和具有比较优势的生产成本对于中国肉牛产业的资深一体化经营企业具有较强的吸引力。建议推动该类企业赴埃塞开展产业合作，尝试建设全产业链示范项目，在架子牛供给的优势地区，建设青贮饲料基地、育肥基地和屠宰工厂的一体化发展模式，进行有效的生产成本控制。建议与埃塞现有的生产基础进行有机结合，并在基础牛改良和农户架子牛养殖等方面与世界银行等国际组织的相关发展援助实现价值链合作。政府方面则给予相关园区政策支持，吸引企业赴埃发展。在市场方面，基于当前基础，建议短期内以中东市场为主，中长期可瞄准更广阔的国际市场。

6.4 长期合作展望

埃塞肉牛价值链发展的关键制约在于疫病防控和成本控制。待埃塞经过长期努力实现了有效的疫病防控，达到了OIE的相关疫病防控要求后，埃塞的肉牛产业将迎来快速发展。在埃塞加强疫病防控的较长时期里，埃塞可通过知识合作和能力建设，引进和改良更适合国际牛肉市场需求的牛品种；通过价值链的优化和成本管理，改善育肥环节，降低活牛成本，提高副产品价值，优化物流环节，从而形成更具市场竞争力的牛肉价格。届时，埃塞牛肉的质量和数量都将得到质的飞跃，中国和埃塞将迎来肉牛产业价值链的更广泛合作。

下 篇

中国 - 埃塞芝麻产业 价值链合作研究



芝麻是埃塞俄比亚第二大出口创汇产品，在埃塞国民经济中发挥着重要作用。埃塞芝麻在国际市场上占有重要的一席之地，是世界芝麻的主要生产国和出口国。埃塞政府高度重视芝麻发展并于2016年制定了《埃塞芝麻发展战略》，旨在通过提高生产力、改进质量和增加附加值，大幅提高出口收入，计划到2020年成为全球芝麻出口大国，至少占有25%的全球市场份额，外汇收入翻两番。

长期以来，埃塞和中国一直保持着芝麻贸易往来，双方有非常良好的芝麻合作基础和广阔的合作空间。中国是芝麻的主要消费国和进口国，埃塞曾长期是中国最大的芝麻进口来源国，中国也曾是埃塞最大的芝麻出口国。2016年埃塞出口到中国的芝麻为30.4万吨，达到历史最高量。但近年来出现下滑，2019年埃塞出口到中国的芝麻仅为11.2万吨。中国的芝麻进口需求一直处于增长趋势，芝麻研发和生产技术也居于世界前列，双方有进一步扩大合作的潜能。

7 埃塞芝麻产业价值链文献回顾

本章基于统计数据梳理埃塞的生产和出口基本情况，并基于ATA提供的资料回顾埃塞芝麻产业价值链的发展瓶颈和干预措施。

7.1 埃塞芝麻生产

埃塞是世界种植芝麻的主要地区之一，在全球芝麻生产中占有重要一席之地。世界芝麻种植分布在热带区域到温带区域，遍及海拔500~1500米的地区，主要分布在亚洲的印度、缅甸、中国、巴基斯坦，非洲的苏丹、多哥、尼日利亚、坦桑尼亚、埃塞、乍得、索马里、莫桑比克、乌干达、塞内加尔、马拉维以及南美洲（FAO统计数据库，2020）。其中，非洲的埃塞和苏丹、多哥、坦桑尼亚、尼日利亚等国是非洲主要芝麻生产国和出口国，其芝麻产量较大，已对国际芝麻市场行情产生了举足轻重的作用。

近年来埃塞芝麻产量在波动中快速增加。埃塞自2002年成为全球芝麻产量前十位的国家之一，产量从2002年的4万吨快速增长，于2010年达到第一次高峰33万吨，位居世界第四位；之后在波动中保持相对稳定，2018年为30万吨，占全球总产量的5%，并自2015年以来保持为世界第七大芝麻生产国，前六位均为苏丹、缅甸、印度、尼日利亚、坦桑尼亚、中国（FAO统计数据库，2020）。

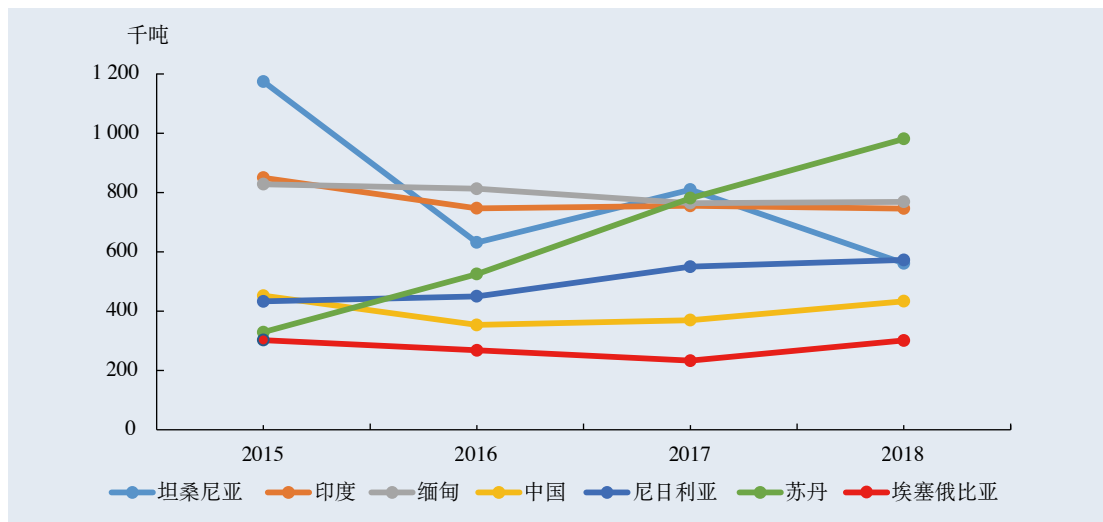


图7-1 2015—2018年芝麻总产前七位国家的芝麻总产比较

数据来源：FAO统计数据库（FAOSTAT），查询时间2020年5月。

埃塞芝麻单产高于世界平均水平，但与最高水平相比仍有差距。埃塞芝麻单产处于波动状态，近十年来平均水平为718千克/公顷（图7-2），而撒哈拉以南非洲地区的芝麻单产水平为1000千克/公顷（CSA, 2020；FAO统计数据库，2020）。2018年埃塞芝麻单产为726千克/公顷，世界芝麻单产为512千克/公顷。埃塞的单产水平居于中国 and 尼日利亚之后，高于苏丹、缅甸、印度和坦桑尼亚等国家（图7-3）。埃塞芝麻单产主要受制于缺少改良的种子、适宜的技术以及其他因素（Teklu et al., 2021）。

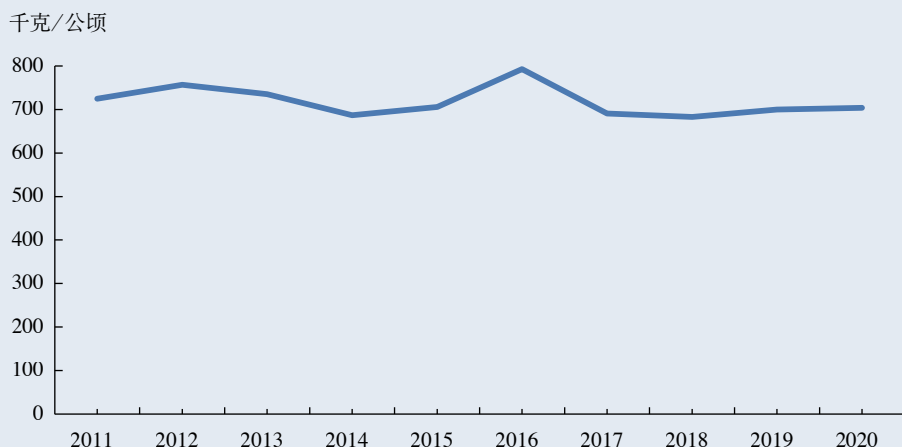


图 7-2 2011—2020 年埃塞芝麻平均单产比较

数据来源：埃塞俄比亚中央统计局（CSA），2019/2020。

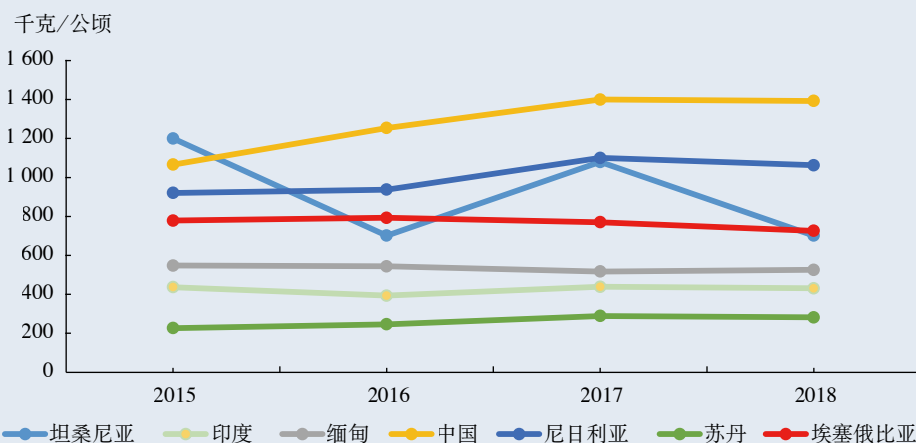


图 7-3 2015—2018 年芝麻总产前七位国家的芝麻平均单产比较

数据来源：FAO 统计数据库，查询时间 2020 年 5 月。

埃塞芝麻主要依靠面积增加提高总产，种植面积在芝麻种植大国中相对较少。2018 年埃塞芝麻种植面积为 30 万公顷，占全球芝麻面积 3%。面积的变化与总产的变化保持较为一致的趋势，表明总产的变化主要由芝麻种植面积的增减引起（图 7-4）。从前七位国家的比较来看，埃塞的种植面积比中国之外的其他五国都相对更少（图 7-5）。近年来，一些非洲国家如苏丹、尼日利亚等通过快速增加种植面积极大地提升了芝麻产量。如苏丹的总产在近几年快速增加，其芝麻产量在 2018 年为 98 万吨，居于世界第 1 位，主要是因其种植面积的快速增加，2018 年达到 348 万公顷，是其 2015 年的近 4 倍。

埃塞的芝麻主要由小农户及中大型商业农场种植，所在区域相对集中。2019 年，约有 54 万个小农户从事芝麻生产（CSA，2019/2020）。与苏丹接壤的提格雷州和阿姆哈拉州是主要的芝麻种植区，占全国产量的 80% 以上。根据埃塞中央统计局关于小农和中大型商业农场芝麻

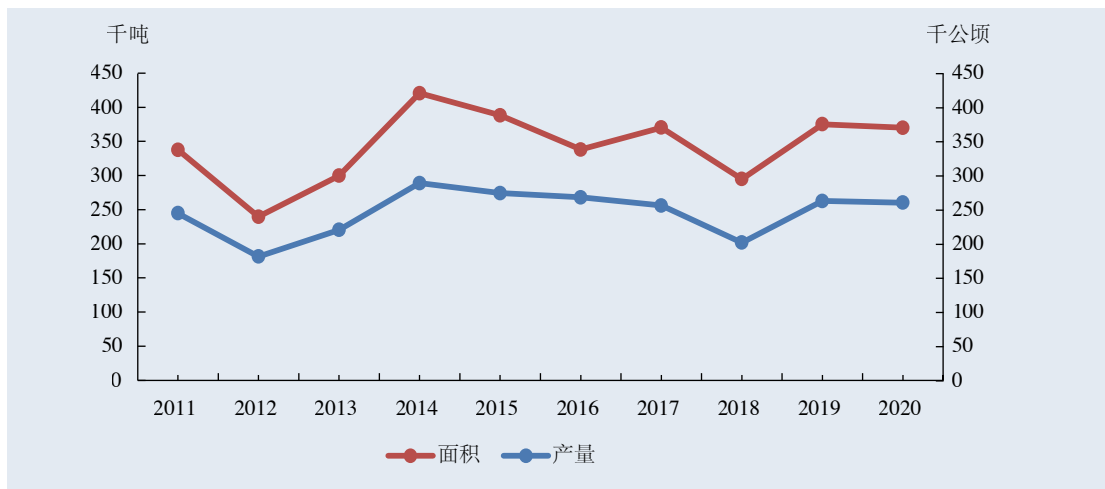


图 7-4 2011—2020 年埃塞芝麻种植面积和产量

数据来源：埃塞俄比亚中央统计局 (CSA)，2011/12—2020/21。

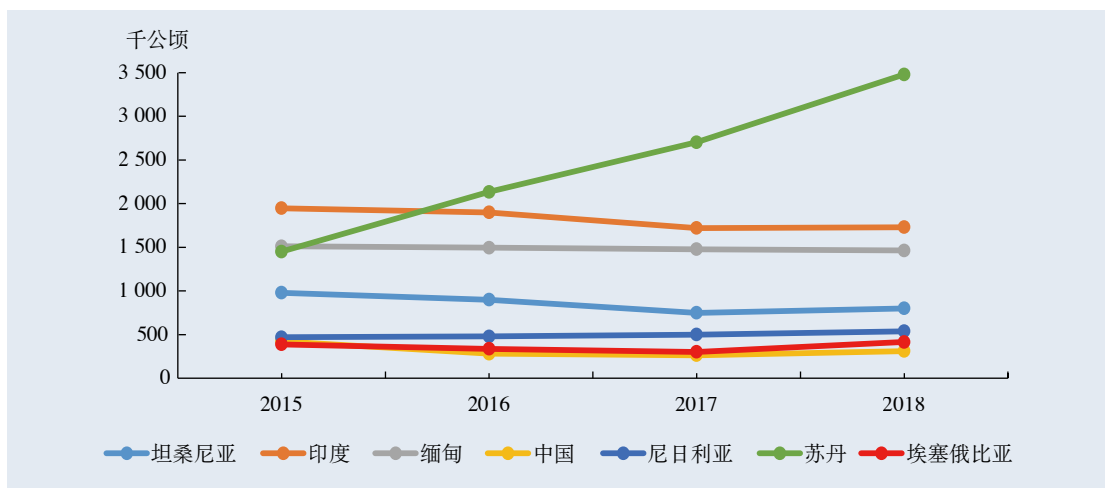


图 7-5 2015—2018 年芝麻总产前七位国家的芝麻种植面积比较

数据来源：FAO 统计数据库，查询时间 2020 年 5 月。

面积和产量的报告 (CSA, 2019/2020)，提格雷州的芝麻产量份额最大 (43.7%)，随后是阿姆哈拉州 (41.92%)、本尚古勒-古马兹州 (7.3%)、奥罗米亚州 (6.3%)。根据芝麻的温度和降雨量要求，阿法尔州、南方州和索马里州是扩大芝麻生产的高潜力区域。近年来，阿法尔州、南方州、甘贝拉州和索马里州的商业农场以及南方州的小农户已经开始大面积生产芝麻。

7.2 埃塞芝麻出口

芝麻是仅次于咖啡的第二大出口作物，也是埃塞国内生产总值的主要贡献者 (Gebremedhn, 2019)。图 7-6 是 2011/12—2016/17 年芝麻出口值。

埃塞是主要芝麻出口国之一，近年来市场份额有所下降。芝麻是埃塞主要的经济作物，埃塞本地人食用芝麻很少，97% 为生芝麻出口，约 3% 加工成去皮芝麻或芝麻酱出口。2019 年埃塞芝麻

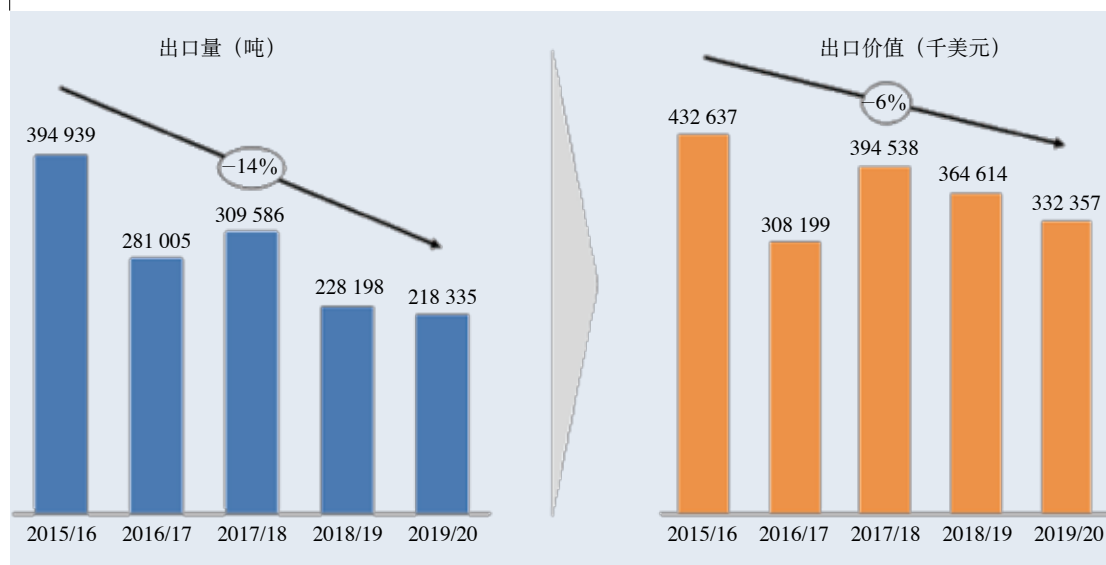


图7-6 2015—2019年埃塞芝麻出口量和出口价值

数据来源：埃塞税务海关总署（ERCA, 2015/16—2019/20）

出口量约25万吨，约占世界出口总量的17%，位于苏丹、尼日利亚之后，与印度并列第三（表7-1）。

表7-1 2013—2019年主要芝麻出口国的市场份额

国家		2013—2014	2014—2015	2015—2016	2016—2017	2017—2018	2018—2019
苏丹	出口量（万吨）	11	19	17	29	39	50
	占比（%）	8.5	13.0	10.4	19.9	24.7	33.8
尼日利亚	出口量（万吨）	18	22	27	28	27	28
	占比（%）	14.5	15.0	16.7	18.8	17.0	18.9
印度	出口量（万吨）	30	33	32	29	28	25
	占比（%）	23.9	22.6	19.8	19.9	17.8	16.9
埃塞俄比亚	出口量（万吨）	29	28	42	29	32	25
	占比（%）	23.2	19.4	26.0	19.7	20.5	16.9
西北非/ 多哥	出口量（万吨）	13	19	20	13	12	20
	占比（%）	10.1	12.6	12.3	8.6	7.7	13.2
坦桑尼亚	出口量（万吨）	12	13	14	10	8	14
	占比（%）	9.2	9.1	8.6	6.5	4.8	9.5
莫桑比克	出口量（万吨）	5	5	5	5	7	7
	占比（%）	4.3	3.5	2.9	3.2	4.2	4.4
中国	出口量（万吨）	4	3	2	4	3	5
	占比（%）	3.0	2.2	1.5	2.4	2.1	3.0
乌干达	出口量（万吨）	4	4	3	2	2	3
	占比（%）	3.2	2.7	1.8	1.1	1.3	1.7

数据来源：整理自中国粮油商务网（<https://www.fao.com.cn/>）。

埃塞芝麻出口以初级产品为主，出口市场集中。埃塞芝麻约97%为生芝麻形式出口，不超过5%加工成去皮芝麻、芝麻酱出口。约60%的生芝麻出口到中国，约30%的生芝麻出口到以色列。

列、土耳其、约旦、韩国、希腊等；加工芝麻的主要市场目的地为美国、荷兰、以色列、日本、阿联酋和德国。近年来在中国等主要市场中，埃塞芝麻出口份额的价值和数量呈下降趋势。

埃塞芝麻出口组织有序，主要通过埃塞商品交易中心（ECX）出口。芝麻从生产者到达ECX主要有5个渠道：①农民→合作社→ECX；②农民→初级交易中心的贸易商→ECX；③大农场主→ECX；④大农场主→出口；⑤初级合作社→出口。

7.3 芝麻价值链的主要利益相关者

芝麻作为埃塞重要的出口创汇产品，其生产组织得到多部门的广泛支持，主要包括如下部门、组织和群体。

（1）直接相关的政府部门、机构和个体

①农业部（MoA）：负责制定国家农业发展总体政策和战略并协调实施，负责将新开发的技术通过广泛的推广体系进行推广。

②地区农业局（RBoAs）：负责协调和领导本地区的农业发展。开发一揽子推广计划，为地区和县级农业部门提供推广服务支持；促进发展合作伙伴之间的协调和统一，确保在区域和县级层面提供协调的农业发展服务。

③埃塞俄比亚农业研究所（EIAR）和区域农业研究所（RARI）：负责开发、调整和推广提高农业生产力所需的农业技术，在改进品种、农艺和农具等技术方面以及最新信息的开发、发布和推广方面发挥着关键作用，并负责种子研发和提供基础种子。EIAR负责协调全国性研究，RARI负责开展专项研究，主要开发针对特定地区的技术和建议。EIAR管理多个联邦研究中心，每个研究中心都被授权从事一组专门的农业研究课题。国家芝麻研究由胡梅拉农业研究中心负责协调，其他参与芝麻研究的研究中心分布在Werer、Gonder、Pawe、Bako、Gambela和Jigijja，此外，Mekelle、Axum、Semera、Gondar、Jigjiga和Wollega大学等也参与芝麻研究。除作物研究中心外，还有Asella、Bako、Melkasa、Bahirdar等农业机械化研究中心，专注于农业机械样机的生产和进口机械的测试。

④埃塞俄比亚农业转型局（ATA）：由埃塞政府创建，主要目的是通过支持政府、私营部门和其他非政府部门的现有框架来促进农业部门转型，解决系统性瓶颈问题，完成国家优先议程，实现农业增长和粮食安全。主要任务是通过支持和提高农业部及其他公共、私营和非政府执行伙伴的能力，解决农业部门的系统性瓶颈问题，最终目标是改善芝麻种植者的生计。目前，ATA与其他合作伙伴一道致力于识别系统性瓶颈并制定解决方案；为实施项目管理、技术援助和知识共享等活动提供支持；加强主要公共、私营和民间社会合作伙伴的能力建设，确保干预措施的可持续性；促进高度优先领域利益相关者之间的联系和协调，以实现商定的里程碑和目标。

⑤财政和经济发展部（MoFED）：制定发展政策、计划和预算；调动和管理外部资源；建立高效的公共财政和财产管理与控制体系。通过影响政策制定和资源分配，该部门在芝麻生产方面具有重要作用。

⑥联邦合作署（FCA）：制定并执行联邦合作条例，致力于为国内各类合作社创造有利环境。通过其影响力，为芝麻产业中高效和竞争力强的合作组织提供有利环境，在芝麻产业中发挥关键作用。

⑦高等教育机构：目前全国共有30多所大学和学院。许多老牌大学，如哈罗马亚大学

(Haromaya University)、梅克尔大学 (Mekele University)、哈瓦萨大学 (Hawassa University)、巴哈达尔大学 (Bahir Dar University)、安博大学 (Ambo University) 和季马大学 (Jimma University) 都设有农学院, 从事农业研究和推广, 主要解决所在地区的重点制约问题。

⑧生物多样性保护研究所 (IBC): 作为联邦政府的研究所, 其任务是确保保护生物多样性、可持续利用资源、获取和分享生物资源的优点。在农作物方面, IBC 拥有一个基因库, 用于保护本土种质资源。在改良品种识别、开发和维护, 大范围技术应用的风险管理和识别等领域中, IBC 是重要的合作伙伴。

⑨种子企业: 埃塞种子企业 (ESE) 与阿姆哈拉和提格雷地区的区域种子企业 (RSE) 是埃塞种子行业的代表, 在种子生产和分配中发挥着重要作用。通常, 种子企业具有双重任务, 既要落实政府制定的主要作物改良种子的目标产量, 又要作为独立的营利性企业运作。

⑩埃塞俄比亚种子种植者和加工者协会: 在正规的私营或公共种子部门发挥协调作用, 努力强化种子系统, 并在基于国际种子检验机构 (International Seed Testing Agency) 模式的政策制定中发挥倡导作用, 例如参与制定种子法。

⑪农业投入供给企业: 主要负责进口和分配包括化肥在内的关键农资。

⑫国家和地区土壤检测实验室: 通过开展各种土壤分析工作支持推广服务, 同时也会为私营部门提供服务。共有 18 个实验室, 包括在亚的斯贝巴的国家土壤检测实验室, 其余 17 个分布在 7 个地区。

⑬农民、商业和国有农场: 大中小型芝麻种植户是埃塞芝麻发展战略的最终受益者。商业和国有农场在实现芝麻产业整体发展、扩大机械化种植方面发挥着重要作用。

⑭初级合作社与合作联盟: 农业合作社在满足小农户需求方面发挥着重要作用, 包括提供投入品、销售农产品等服务。

⑮埃塞商品交易所 (ECE): 作为一个组织化市场, 买卖双方在此处交易, 确保数量、质量、付款和交货, 目前主要交易品为咖啡、芝麻和豆类作物。

⑯私营部门: 芝麻价值链可以在私营部门投资和参与中收益。私营部门在诸多领域通过各种商业模式 (如公私合营) 发挥主导作用, 包括农业投入品生产和分配, 收割等机械的生产、分配、进口和出口, 机械化服务, 农产品加工与销售等。

(2) 其他相关部委

①贸易部 (MoT): 芝麻国内和出口市场的主要利益相关者。由于埃塞正在努力扩大芝麻的常规和高级市场, 该部门在制定和实施促进芝麻生产与销售的政策中发挥了关键作用。

②工业部 (MoI): 提供有利的政策环境, 支持农产品加工业发展。

③外交部 (MFA): 在国际上宣传埃塞的农业开发潜力, 吸引更多外商直接投资。

④妇女、儿童和青年事务部 (MoWCFA): 推动主流性别群体改善妇女在国家整体发展中的参与度, 在解决农业部门的性别问题中发挥关键作用, 包括芝麻生产和销售。

(3) 开展芝麻研究的国家和地区项目

①农业增长计划 (AGP): 由多方资助的综合计划, 以埃塞政府关注的增强可持续农业增长为基础。作为政府五年增长和转型计划 (Growth and Transformation Plan, GTP) 的重要组成部分, 以及可能延伸到下一个 GTP, AGP 起到了补充作用, 在埃塞的潜在富裕但

不发达地区促进了农业增长。

②农业增长计划实施区域的芝麻商业网络、农业综合企业和市场开发项目：由执行伙伴ACDI/VOCA, Agriteria和SNV主导，他们都是埃塞芝麻价值链中与地区农业研究中心和农业局合作密切的非政府组织。

(4) 金融机构

①埃塞俄比亚商业银行：作为埃塞最大的商业银行，凭借其广泛的网络和巨大的资源，该银行在解决芝麻价值链上的金融需求中发挥着不可或缺的作用。

②其他金融机构：银行、信贷和储蓄机构、小额信贷机构以及农村储蓄和信贷组织等都可以发挥作用。为从业者提供资金支持，主要包括德彼特储蓄和信贷（Dedebit Saving and Credit）、阿姆哈拉信贷和储蓄机构（Amhara Credit and Savings Institution）、奥罗米亚信贷和储蓄股份有限公司（Oromia Credit and Savings Share Company）、奥莫小额贷款公司（Omo Micro Finance）。

7.4 芝麻价值链的瓶颈及干预措施

《埃塞芝麻发展战略》梳理了芝麻产业价值链的五个环节，包括：①研究和技术开发；②投入品生产、供应和分配；③田间生产；④收获后处理和农业加工；⑤市场。

该战略指出了阻碍埃塞芝麻发展的27项挑战，主要包括：①改良的种子品种没有得到有效开发、生产和分配；②农艺措施没有得到有效研究和向农民传播；③合作社没有能力满足农民的投入和产出需求。该战略还针对以上挑战确定了44项干预措施，提出了详细的行动方向（表7-2）。

表 7-2 埃塞芝麻产业价值链面临的挑战和拟采取的干预措施

价值链环节	挑战	拟采取的干预措施
研究和技术开发	改良品种未随着时间和农业生态而不断发展	通过现代植物育种技术加强芝麻育种工作 繁育足够的初代种子 增强国家芝麻研究能力
	芝麻研究能力建设有限	提高研究人员的技术和知识水平 发展芝麻研究的基础设施
	农民目前使用的芝麻品种农艺和市场属性都不理想	实施基于农业生态学的合适的农艺实践 加强面向市场的芝麻品种开发和推广 开发耐粉碎的芝麻品种
	推荐的农艺措施和害虫管理并不详尽，对农业生态采用一刀切的方法	实施基于农业生态学的关键农艺实践研究 开展协调研究，并提供针对害虫的安全综合控制方法
	芝麻机械化研究缺乏	开展关键机械化技术的研究，如播种机和收割机
	研究与推广关联较弱	加强研究与推广的联系，加快技术传播
	对芝麻生产的集中灌溉技术研究有限	加强芝麻生产灌溉技术的研究
	关于芝麻的社会经济研究有限	对主要产区的芝麻进行价值链分析 在芝麻种植区加强芝麻品种的应用及影响研究

(续)

价值链环节	挑战	拟采取的干预措施
投入品生产、供应和分配	改进的种子需求评估不能准确捕捉需求	利用现有的农民推广服务网络进行适当的种子需求评估
	薄弱的芝麻种子系统	提高建设正式种子系统的能力，以便为不同的农业生态有效地繁殖和分配改良种子
	联邦信贷联盟（FCUs）供应投入能力差	引入基于社区的种子系统 鼓励私营部门生产和销售种子
	芝麻种植户获得投入信贷的机会有限	建立FCUs的金融能力，以满足芝麻生产的投入需求 加强芝麻FCUs和农药供应商之间的联系 建立并强化农村储蓄和信贷合作社（RuSACCOs） 加强小额金融机构提供投入凭证服务 建立芝麻基金
田间生产	芝麻主产区的农民获得推广服务的机会有限	加强各级农业专家的能力建设，为农业社区提供可持续的推广服务
	芝麻生产缺乏综合信息	制定综合性的信息手册和产品包装 通过利用不同的信息传播方法（网站、大众媒体传单和海报）解决芝麻生产技术问题
	芝麻单季种植	芝麻种植制度的意识培养 进行缓解芝麻单季问题的系统研究
	芝麻生产仅限于一些潜在领域最佳实践的推广不足	在全国其他潜在的种植区推广芝麻生产 扩大和推广该国不同农业生态的最佳农艺实践
收获后的处理和加工	主要芝麻产区的农民收获后处理不佳	培养芝麻收获后处理的意识，推广最佳实践经验 引入适当的收获后处理技术
	缺乏劳动管理制度	为劳动管理制度创造有利环境
	基础设施有限	提供并发展适当的基础设施
	附加值非常低	为加工者提供有利环境，提升芝麻农产品加工业 提供优质而充足的原材料
市场营销	质量低，数量不足	提供足够数量的高质量产品
	质量控制体系执行不力	强化芝麻质量控制体系的执行力 强化和推广芝麻品牌
	初级合作社和工会对营销的参与有限	建设初级合作社和FCUs的金融和技术能力，以增加向传统市场的出口量 建设初级合作社和FCUs的能力，以将芝麻种植户与高价值市场有效地联系起来
	欠发达的可追溯性和有机认证	引入可追溯机制和有机认证体系
	薄弱的市场信息和推广系统	使用不同技术获取市场信息 加强市场推广
	基础设施和后勤设施有限	提供并发展适当的市场营销基础设施和后勤设施

为了改变芝麻行业，该战略也提出了解决方案，指出埃塞应侧重于：①继续向其传统市场出口；②进一步丰富更高价值的传统市场；③进入优质市场；④增加附加值。

8 中国芝麻生产发展经验

芝麻是中国重要的特色油料作物之一，种植历史悠久，全国均有分布，广泛用于榨油、食用、医药、化工等。

8.1 芝麻种植

中国是世界芝麻主要生产国之一，产量自2003年以来处于大幅下降趋势，近两年略有回升（图8-1）。2002年中国芝麻产量为90万吨，达到产量最高峰，当年占世界总产的31.9%，为世界芝麻生产第一大国，2003年开始波动下降，2018年中国芝麻生产总量43万吨（中国统计年鉴，2019），占世界总产的7.2%，居世界第6位（FAO统计数据库，2020）。

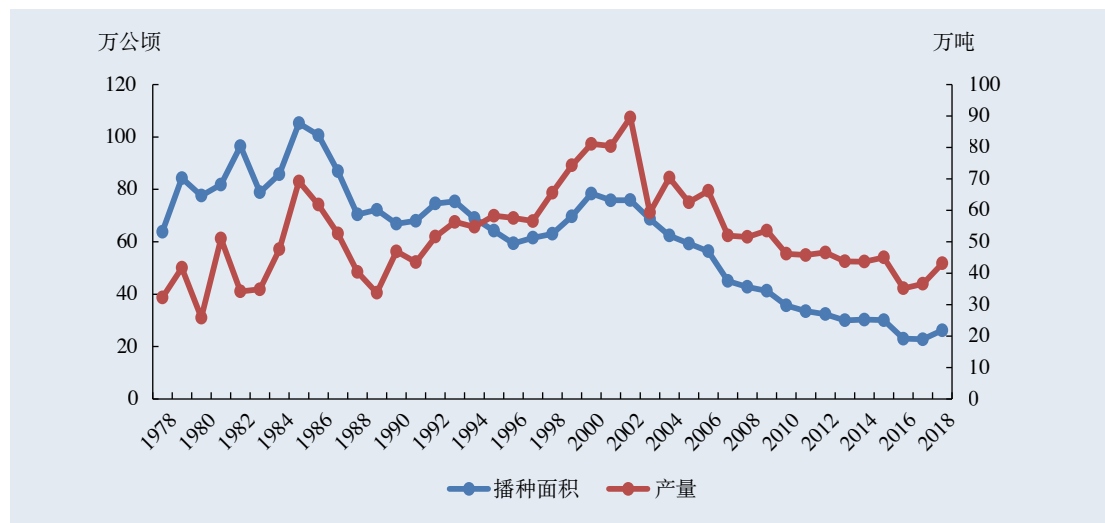


图8-1 1978—2018年中国芝麻产量和种植面积

数据来源：《中国统计年鉴》。

中国芝麻面积在波动中下降，近两年略有回升。新中国成立初期中国芝麻面积为106万公顷，之后在60万~106万公顷间波动。2003年开始，诸多因素叠加导致芝麻种植面积大幅下滑：①为保障粮食安全，中国农业产业结构进行了调整；②主产区农户种植芝麻收益低于玉米等其他秋季作物；③大量青壮年劳动力外出务工，农户更倾向于选择便于机械化作业的作物；④大量进口芝麻对国内芝麻生产形成较大冲击，2017年芝麻种植面积跌至历史最低值24万公顷。2017年以后，芝麻价格持续高位，收益相对其他经济作物的优势显现，河南、安徽等各主产区政府也对芝农实施了补贴政策，种植面积开始恢复性增长。2018年种植面积为26万公顷（国家统计局，2020），居于世界第5位（FAO统计数据库，2020）。近年来，适合机械化播种和收割的芝麻品种及农业机械研发取得了实质性突破，即将具备量产条件，中国的芝麻种植面积和产量将有望实现持续恢复性增长。

中国芝麻单产持续提升，长期居于世界芝麻单产前列。1978年中国芝麻单产为505千克/公顷，之后除了气候异常等自然因素影响，芝麻单产一直保持上升态势（图8-2）。2018年芝麻单产为1645

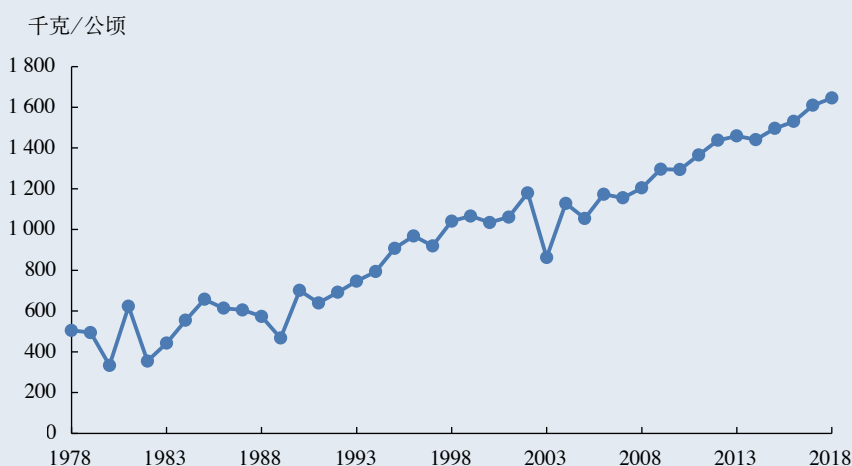


图 8-2 1978—2018 年中国芝麻单产

数据来源：《中国统计年鉴》。

千克/公顷，是 1978 年的 3.3 倍，是世界平均水平 512 千克/公顷的 3.2 倍，居于世界芝麻单产第一位。

芝麻在中国广泛种植，产区集中。除青海和西藏自治区，芝麻在全国其他各省和自治区均有种植，自北向南有一年一熟、一年两熟和一年三熟制，江淮、黄淮流域和东北主要生产白芝麻，长江以南地区主要生产黑芝麻。芝麻种植集中分布在长江、黄河和淮河三大流域，主产省为河南、湖北、安徽和江西，四省芝麻面积和总产量均占全国的 70%。

中国的芝麻生产长期以小农户自主种植为主，近年来开始出现较大规模和组织化生产。新中国成立以来，芝麻种植以小农户自主种植为主，政府对重点产区进行生产引导，传统小农户芝麻种植面积为 0.15 ~ 3 公顷。近年来，随着国家土地流转政策的实施，一些种植芝麻大户开始出现，生产规模从 7 公顷左右至 700 公顷不等；也开始出现由公司或农场组织生产芝麻，例如湖北某公司的生产规模达到 666 公顷。

目前，发展较快、组织规模较大的模式为“农业合作社+种植户”。该模式的一般规模为 70 公顷以上，较大规模可达 1 000 公顷以上。近年来，随着新型农业专业合作社的主体作用不断发展，这些合作社既是经营主体，又具有多种职能，可向农户销售农药、种子、化肥等农资，为农户提供农机作业有偿服务，组织农产品销售，与采购商商谈价格，邀请农业专家对本区高素质农民进行技术培训，为种植农户提供各种农业信息等。因此，小农户对合作社的信任度和依赖度越来越高，该模式得到迅速发展。

8.2 芝麻品种研发

新中国的芝麻品种改良经历了三个阶段^①。第一阶段为新中国成立之初的 20 年，即 1949—1969 年，主要采用系统选育方法，即从原始的地方品种中选择优良品种或品系进行利用。第二阶段为 1970—1989 年，采用常规杂交、系统选育和诱变育种多种方法结合。第三阶段为 1990 年开始至今，以常规杂交育种方法为主，仍保留系统选育和诱变育种方法，

^① 本章的芝麻产业价值链相关数据和技术情况主要由中国农科院油料所张秀荣研究员团队提供。

随着细胞核雄性不育材料的发掘创制和分子标记开发，开展了雄性不育杂种优势利用和分子标记辅助选择育种。各阶段的主要品种系列见图8-3。



图8-3 新中国成立以来三次芝麻品种更新换代

中国的芝麻品种主要为白芝麻和黑芝麻，其中白芝麻的品质尤为优良，近年来随着品种改良，其品质持续提升。中国白芝麻品种含油量55%以上，蛋白质含量20%左右，口感香甜，属于油、食兼用型。

中国芝麻登记注册的品种繁多，产量高，品质优。现有中芝、鄂芝、豫芝、郑芝、驻芝、漯芝、赣芝、皖芝、陕芝、晋芝、汾芝、辽芝等近20个系列共180多个品种。比如，中国农业科学院油料作物研究所选育的白芝麻“中芝11”（图8-4），具有植株高大、高产、优质、抗病、抗逆等优良特性，口感香甜，产量1 500 ~ 3 000 千克/公顷，生育期95 ~ 110 天，含油量55% ~ 59%，千粒重2.8 ~ 3.0 克。



图8-4 高产优质抗逆品种“中芝11”

8.3 芝麻生产技术研发与应用

8.3.1 机械化生产

自2000年起，中国芝麻生产进入了机械化发展阶段。随着中国经济的快速发展，大量

农村劳动力进城，用工成本逐年增长，中国芝麻的规模化生产需求显著增加。为此，中国已研发一系列芝麻机械化技术，并选育出适合机械化收获的品种。通过采用机械化和品种，生产成本已从15 000元/公顷降到约10 425元/公顷（中国鄂州，2019年调研，含土地流转费），正在芝麻主产区进行大面积示范推广。这将推动中国芝麻从小农户种植向规模化转型，促进中国芝麻面积恢复增加。

中国芝麻机械化技术已应用在播种、病虫害防控、收获等生产环节，具体如下：

(1) 机械化联合直播技术。通过一台机械完成七道工序，包括土地耕整、起垄、开沟、施肥、播种、覆土、喷除草剂，生产效率为0.35公顷/小时（图8-5）。



图8-5 芝麻机械化联合直播

(2) 无人机防控技术。采用无人机喷洒农药防治病虫害；幼苗期喷洒植物激素，调控株高；收获期喷洒干燥剂，调控水分，生产效率为3公顷/小时（图8-6）。

(3) 机械化联合收获技术。使用中国生产的联合收割机进行芝麻收获，可以达到机收芝麻含杂率10%以下，籽粒破损率1%以下，总损耗15%以下，生产效率为0.6公顷/小时。

2019年中国农科院油料作物研究所在鄂州实地调研的数据显示，芝麻机械化生产，除去购买农机的成本以外，从整地到播种环节，采用机械化比人工操作的生产效率可提高10倍以上，收获环节采用机械化联合机收生产效率约是人工操作的100倍，芝麻采用机械化生产模式相比人工种植模式可减少用工72人/公顷，折合7 200元（100元/人），而且秸秆粉碎全量还田，有利于培养地力，对环境友好。机械化种植模式下，规模化农户生产比传统人工种植模式的总成本可减少3 690元/公顷，下降36%（图8-7）。



图8-6 无人机喷洒农药或植物调节剂



图8-7 中国芝麻联合收获技术

8.3.2 主要高产栽培技术

一是根据品种特性合理密植提高单产。合理密植能增加单位面积上的芝麻株数，从而扩大叶面积系数，更充分利用光、水、二氧化碳和无机盐类，在生长中使其转化为更多的有机物质和经济产量。根据品种特性合理密植的芝麻地，一般单产可提高到1 125 ~ 2 250 千克/公顷，最高达到3 000 千克/公顷。中国芝麻生产上应用较为普遍的为单秆型品种，多采用机械条播或人工撒播，条播行距25 ~ 35 厘米，株距13 ~ 20 厘米，密度150 000 ~ 225 000 株/公顷。

二是施用化肥是增加产量的重要措施。根据土壤肥力水平和品种需肥规律进行科学施肥可显著提高产量。研究表明，每形成50 千克芝麻种子需要吸收氮4.48 千克、磷1.015 千克和钾4.5 千克。在中国芝麻生产实践中，一般是在播种前耕整土地时，每公顷施用氮磷钾复合肥（N : P : K=15% : 15% : 15%）约375 千克作为底肥；在现蕾初花期，根据苗情长势酌情施用氮肥（尿素），一般用量为75 千克/公顷左右。

三是病虫草渍害综合防控。选用抗病抗逆品种，播种覆土后喷洒芽前除草剂“金都尔”（精异丙甲草胺）和苗期喷洒除草剂（精喹禾灵），幼苗期和盛花期防治虫害，雨后及时排渍防涝，干旱时进行灌溉等，均是保证芝麻高产稳产的有效农业措施，可减灾增产10% ~ 30%。

8.4 中国芝麻加工业发展

中国芝麻制油生产工艺技术先进，已自主研发成套芝麻油生产设备。制油技术研发正向绿色、营养、高附加值发展，主要有高温焙炒制油技术（高温炒籽<180℃，热榨、水代、浸出）和低温制油技术（炒籽温度60 ~ 90℃，压榨、冷榨、萃取）。截至目前，为规范芝麻油加工的质量安全相关指标值，控制风险因子，国家已制定发布了6 项国家标准。中国自主研发的芝麻油生产成套设备可以较好地控制加工过程中不利于健康的风险因子。

中国芝麻加工企业众多，主要集中在河南、安徽、山东等地，以芝麻香油、芝麻酱和麻仁加工为主。近年来，还在冷榨芝麻烹饪油、芝麻休闲食品、芝麻保健品加工生产等新的领域有较快的发展。

其中，芝麻油生产集群发展成熟，芝麻加工油脂规模企业有100 多家，从压榨油生产芝麻饼流通、芝麻饼浸出油生产、芝麻精炼油生产到芝麻粕产销，生产链非常完整，有很强的规模化、产业链化生产竞争优势。芝麻油加工大型企业主要有：合肥燕庄食用油有限责任公司、益海嘉里金龙鱼粮油股份有限公司、上海富味乡油脂食品有限公司、瑞福油脂股份有限公司、山东鲁花集团有限公司、安徽华安食品有限公司等。中小型芝麻油加工企业数量众多，较为集中的产地如安徽省含山县、河南省南阳市、河南省驻马店市、河北省大名县、湖北省枣阳市等。

色选芝麻加工企业主要集中地有山东省青岛市和安徽省安庆市。食品麻加工企业众多，主要麻仁加工企业有益同创鑫（天津）粮油有限公司、江苏福马粮油有限公司、安徽龙溪外贸麻油制造有限公司、河北厚鑫粮油有限公司等。中小型麻仁厂众多，主要集中地有安徽省涡阳县等。

芝麻酱及芝麻休闲食品加工企业主要有南方黑芝麻集团股份有限公司、安徽燕之坊食品有限公司、山东知味轩食品有限公司、山东十里香芝麻制品有限公司等。

近年来在芝麻深加工方面也进行了工艺改进，成功研发了“油-蛋白-芝麻素”联产模式。芝麻素提取加工企业主要集中地为陕西省西安市，生产厂家主要有河北共创生物科技有限公司、西安泽朗生物科技有限公司、西安秋禾生物科技有限公司、陕西泰克生物科技有限公司等。

8.5 中国芝麻产业价值链发展经验

回顾中国芝麻产业的发展，虽然中国芝麻的生产面积因为多种因素影响已大幅下降，但随着中国经济的快速发展和人民生活水平提高，消费量逐年增加，需求多元化，持续推动着芝麻产业逐步提升，中国芝麻生产技术研发实力雄厚，芝麻单产保持着世界第一的地位，芝麻加工业持续蓬勃发展。发展经验概括为以下三点：

一是各级政府立项，为培育研发队伍和研发平台提供资金支持。改革开放以来，中国科技部、农业农村部，河南、湖北、江西、山西、河北等主产区省级科技厅均设立科技项目资金支持芝麻科研。自2008年起农业部设立了国家芝麻产业技术体系（2017年起并入特色油料产业技术体系），每年投入1200万元组织全国芝麻科研人员进行科技攻关。目前，全国从事芝麻育种、农艺技术、加工和品质检测等科研队伍约300人，专业实验室10余个。

二是科研成果的大力普及应用，推动中国芝麻产业价值链提升。中国从农业农村部到省、市、县、乡镇级，有庞大的技术推广体系，科研人员研发的科技成果交由推广部门进行示范普及。科研成果除了国家推广体系得以推广应用，还开展了以市场需求为导向的校企合作研发，走出了一条成功的路子，例如中国农业科学院油料作物研究所与合肥燕庄食用油有限公司、中垦锦绣华农武汉科技有限公司、合肥丰乐种业股份有限公司等合作，在促进种业发展、改进加工工艺、提高产品质量等方面成效显著。

三是中国消费多元化需求拉动加工业快速发展。中国芝麻消费市场需求持续增加，近年来中国旅游休闲、高质量生活需求猛增，芝麻加工产品向营养功能、休闲方便发展取向明显。强大的芝麻消费端引导了广大企业的积极供应，现有规模的制油企业上百家，加工产品多元化达上千种。芝麻制油和食品加工技术，主要以降低危害因子、更多地保留营养物质、油脂-蛋白-芝麻素联产、减少废弃物对环境的污染等为主，关注营养健康、提高附加值和绿色化。不过，中国芝麻制油和食用等产品，仍基本属于初级加工，对营养物质的提取和产品转化升级、针对不同特定人群的产品开发，以及在医药、化工等领域的利用开发还有较大空间提高附加值。

8.6 埃塞与中国芝麻生产比较

埃塞与中国的芝麻产业具有不同的发展目标，处于不同的发展阶段，总体来看，埃塞当前大致与中国20世纪80年代至90年代初相似（表8-1）。

表 8-1 埃塞当前芝麻生产状况与中国相似时期比较

项目	埃塞（2018—2019）	中国
产业发展目标	出口创汇，解决就业，增加农民收入	满足国人需要
芝麻籽粒颜色	白色、灰色、棕色和黑色	白色、黑色
品种含油量	48%~56.7%	55%以上
种植面积（千公顷）	295	262（2018年为新中国成立以来最少）
总产量（万吨）	20	24（1977年） 43（2018年）
单产（千克/公顷）	683	744（1993年）
育种技术	系选为主	1970年前
品种数量	30	32（1989年）
种质资源数量	1 500	1 556（1981年）
栽培技术	人工为主	2000年以前
化肥农药施用	无或极少	1980年以前

从目标来看，埃塞本国对芝麻的消费需求很小，以出口创汇、解决农民就业为主；而中国是以满足国人消费为主。

在生产环节，埃塞处于中低产水平阶段，以传统人工种植模式为主，中国自2000年以来进入了高产水平阶段，现代化高效生产模式发展较快。中国的芝麻种植面积持续下降，目前埃塞的芝麻种植面积已超过中国，但埃塞单产较低，总产量只有中国的一半左右。当前埃塞的单产相当于中国1993年的水平。埃塞育种技术尚以系选为主，为中国1970年以前主要采用的育种方法，保有的种质资源和品种的数量都相当于中国20世纪80年代的水平。在栽培技术方面以人工为主，相当于中国2000年以前；极少施用农药和化肥，相当于中国1980年以前。此外，埃塞芝麻生产组织化程度较高，中国芝麻组织生产形式与埃塞比，规模较小且相对较松散。

在加工环节，埃塞当前芝麻加工十分薄弱，主要加工芝麻酱和脱皮芝麻，从业群体小，规模企业非常少，有一些农民采用传统的方法压榨芝麻油，但现代化的芝麻油生产尚未起步。

9 中国芝麻消费与进口

中国的芝麻消费量和进口量均居世界第一位，消费量约占全球的1/3，进口量占全球的近一半，在世界芝麻市场占有举足轻重的地位。

9.1 芝麻消费

中国芝麻消费量居于世界第一位，消费量持续上升，供需缺口大。芝麻是中国传统农产品和风味食品，小磨香油、芝麻酱深受消费者喜爱，作为食品或食材应用十分广泛，加工产品种类繁多，如脱皮芝麻、芝麻汤圆、芝麻糊、芝麻粉、芝麻饼、芝麻糕、芝麻茶等。芝麻在医药、工业领域也被广泛利用，如优质按摩油、软膏基础剂、黏滑剂、化妆品、工业润滑油、香皂等。芝麻饼粕蛋白质是优质蛋白，含有丰富的人体必需的亮氨酸、异亮氨酸、苯丙氨酸等，可加工芝麻蛋白产品，也可用作精饲料或优质肥料。

近年来，随着居民收入的不断提升和食品加工品类的不断丰富，人民追求更高生活品质，芝麻的消费量大幅增长。2019年中国芝麻消费量为128万吨，比2013年增长51.4%，约占全球芝麻产量的35%。而中国芝麻生产量自2003年开始持续下降，供需缺口拉大，近两年随着国内产量提升，缺口略有缩小（图9-1）。

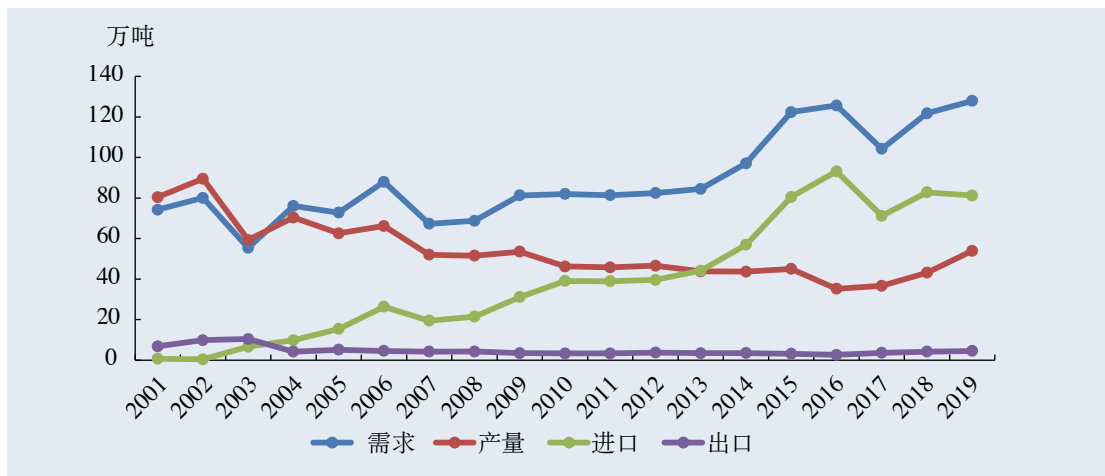


图9-1 2001—2019年中国市场芝麻供需

数据来源：中国粮油商务网。

9.2 芝麻进口

近年来，中国的芝麻进口量也居世界第一位，对外依赖度高达65%以上。2019年中国进口芝麻81万吨，占全球进口量约47.3%。2002年以前，中国曾是芝麻净出口国，随着中国的芝麻供需缺口不断加大，已逐渐转变为最大进口国。中国对进口芝麻的依存度一度接近75%，近两年随着芝麻种植效益提升，依存度略有缩小（图9-2）。

非洲芝麻是中国进口芝麻的主要来源。2019年中国从非洲进口芝麻79万吨，占中国

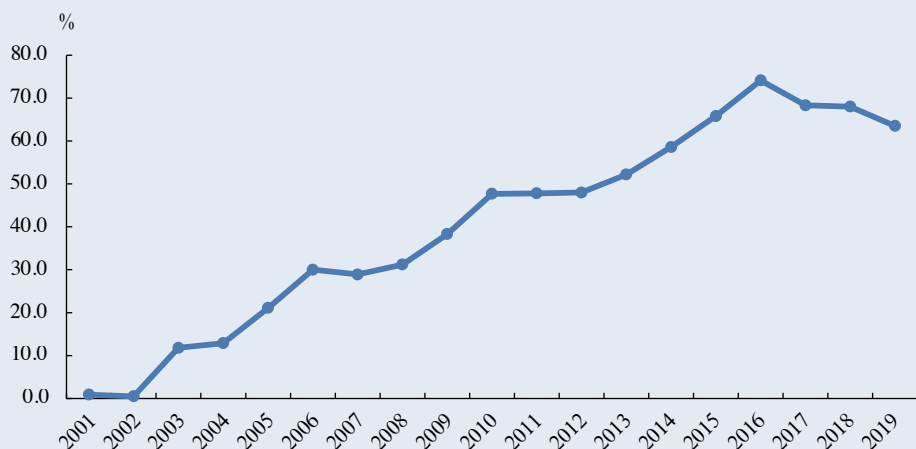


图9-2 中国市场对进口芝麻的依存度

数据来源：根据中国粮油商务网数据计算。

芝麻总进口量的98%。得益于中国的免关税待遇及价格优势，埃塞俄比亚、苏丹、尼日利亚、多哥、坦桑尼亚、莫桑比克、乌干达等非洲国家成为了中国进口芝麻主要来源国。

9.3 中国与埃塞芝麻贸易

埃塞曾是中国进口芝麻的最大来源地，但近年来中国从埃塞的芝麻进口量大幅下降。中国在2018年以前一直是埃塞芝麻出口第一大国，埃塞曾在2012年占据中国芝麻进口市场份额的48%，曾在2016年向中国出口芝麻30万吨，金额3.3亿美元，达到了双边芝麻贸易的最高峰。但由于近年来埃塞芝麻价格高昂等因素，中国进口商进口埃塞芝麻的积极性大幅下降，同时，出口中国所得外汇收入被强制结汇，埃塞芝麻出口商出口中国的积极性也大幅下降，导致2019年埃塞芝麻出口中国仅11万吨，苏丹和尼日利亚分别以17万吨和16万吨超过埃塞，但埃塞仍然是中国进口芝麻主要来源国之一（图9-3）。

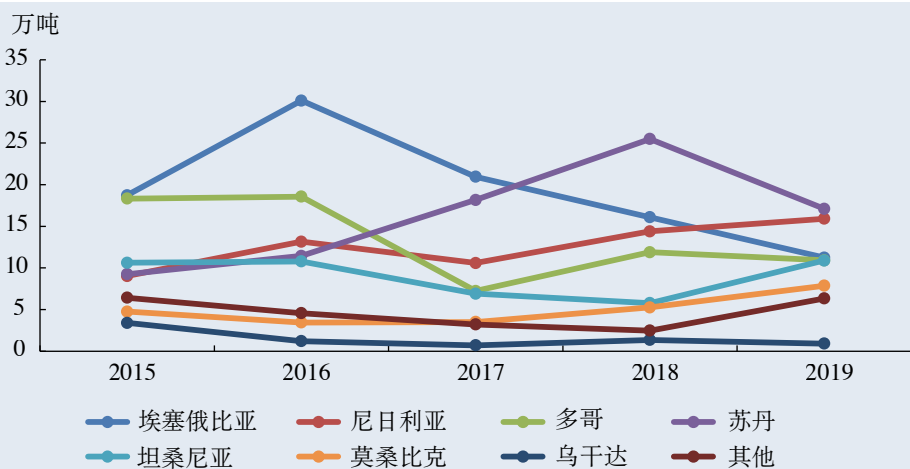


图9-3 2015—2019年中国芝麻主要进口国

数据来源：根据中国粮油商务网数据计算。

9.4 国际芝麻价格

近年来，随着非洲芝麻种植面积持续扩大，芝麻全球供应量较为充足，芝麻价格总体上呈周期性波动，总体受控于供需关系的周期性变化和短期波动影响。

芝麻供需关系受市场自动调节呈现周期性变化。从长期来看，约5年一个周期，当价格走高时，芝农种植积极性增高，种植面积扩大，进而导致供大于求，价格走低，芝农种植积极性降低，种植面积减小，进而导致供小于求，价格走高，周而复始。短期波动影响因素众多，主要取决于中国市场需求变化、主产地天气情况、汇率变化。除此之外，突发政治、经济事件也对芝麻价格造成短期冲击。

近年来，芝麻价格呈现剧烈波动，埃塞一级芝麻于2014年1月达到最高价2 200美元/吨，而2015年11月国际芝麻最低价仅为870美元/吨。2019年国际芝麻产量再一次达到新高，坦桑尼亚芝麻上市后，芝麻价格从1 700美元/吨持续跌落到最低1 250美元/吨。

10 埃塞芝麻产业价值链实地调研

FECC与ATA经过几个月的联合筹备,2019年11月10—16日,FECC组织调研团赴埃塞开展芝麻产业价值链实地调研,团成员共12人,包括农业经济专家,来自芝麻品种、种植技术研发、加工、贸易等重要环节的3位专家和6个业内知名企业的代表,此外还包括联合国国际贸易中心非洲投资与增长合作伙伴(PIGA)项目官员、非洲绿色革命联盟(AGRA)项目官员。

调研团在ATA的密切配合下,瞄准芝麻价值链的重要环节,在6天时间里密集开展了12场调研活动。调研团向埃塞方介绍了中国芝麻产业价值链发展经验和对芝麻贸易的需求,走访了埃塞芝麻产业价值链关键环节的主要利益相关者,包括农业部、商品交易中心(ECX)、油料加工和进出口行业协会(EPOSPEA)、芝麻酱加工厂、芝麻清洗厂等,并赴埃塞芝麻主产区——提格雷州胡梅拉(Humera)地区,对国有大型农业公司、小农户协会、农民服务中心、胡梅拉农业研究中心(HuARC)、ECX胡梅拉仓库、ECX胡梅拉电子交易中心等进行实地走访。团组还拜访了中国驻埃塞使馆经济商务处、中国援埃塞高级专家组等相关机构和专家。

调研期间,埃塞农业部给予了调研团大力支持。埃塞农业部分管芝麻的国务部长顾问向团组介绍了埃塞芝麻发展的总体情况,听取了专家关于中国芝麻价值链发展经验、中国芝麻消费需求与市场发展情况的介绍,希望就芝麻品种改良、机械化生产技术和芝麻加工投资等开展广泛合作。埃塞农业部分管芝麻的国务部长在团组完成对埃塞芝麻主产区的实地考察后接见了团组,听取中国芝麻价值链发展经验介绍和团组赴胡梅拉地区调研收获,双边就制约埃塞芝麻发展的主要问题和下一步合作方向进行了深入探讨,并表示将对未来合作予以大力支持(图10-1)。



图10-1 埃塞农业部副部长、部长顾问会见芝麻调研团

通过调研,调研团收集到了丰富的一手资料,对埃塞的芝麻产业价值链主要环节的现况与关键问题有了更直观的了解和认识。

10.1 宏观支持

埃塞政府以芝麻出口为导向，将芝麻价值链的各利益相关方紧密联系在一起，特别是在生产与贸易环节形成了成熟的组织化体系。埃塞政府于2016制定了《芝麻发展战略》，为芝麻行业设定了雄心勃勃的目标，计划在2020年将芝麻产量提高到44万吨。

埃塞农业部的官员认为，金融是制约埃塞芝麻发展的最大问题，如芝麻研发投入经费不足，芝麻生产者可获得的金融服务十分有限，农机、化肥等农业投入品难以按需购买和使用。

埃塞从农业部高层、地方农业研究中心负责人到大型农场主、小农户合作社负责人，对于与中国开展芝麻产业价值链合作均表现出极大兴趣，期望引进中国的高产芝麻品种和适用的生产技术及农业机械，提高埃塞的芝麻产量，降低生产成本，增加出口数量和提高农民收入，并希望中国企业到埃塞投资建厂发展芝麻加工业。

政府提供政策支持鼓励私营部门投资芝麻加工行业，主要包括：①提供土地租赁补贴；②农产品加工投资者出口或者供应本地市场的至少50%产品可免征所得税5年；③优先区域的投资者有资格获得额外的一年所得税减免；④农业和工业机械设备和原材料进口免税100%。

为推动产业转型，政府已开始建设芝麻产业集群。如位于胡梅拉地区的贝克综合农业产业园区（Beaker Integrated Agro-processing Industry Park）（详见附录2）正在招商，向胡梅拉和阿姆哈拉地区的芝麻集群提供服务。

10.2 研究和技术开发环节

10.2.1 品种研发

为了解埃塞芝麻品种研发和使用情况，调研组走访了胡梅拉农业研究中心等机构。该中心是埃塞农业研究所的下属机构，成立于2002年，现有4个学科，17人从事芝麻研究（11名大学生，4名硕士，2名在读博士生）。埃塞国家级的芝麻新品种登记试验由该中心组织实施，通过试验的品种由农业部的植物品种释放、保护和种子质量管理局颁发证书。截至2019年，埃塞共育成芝麻品种30个，其中，胡梅拉农业研究中心育成的Setit-1、Setit-2、Setit-3和Humera-1等新品种适宜多雨地区芝麻产区种植。

胡梅拉农业研究中心拥有2000份种质资源和育种材料，在室温下保存（温度25~35℃，平均湿度65%），没有资源保存专用低温库或冷藏柜。每年种植一部分，从中筛选优良材料，希望选育出优良品种。该中心育成芝麻品种最高单产为800~1100千克/公顷，农民种植后不施用化肥的单产为300~450千克/公顷，施用150千克/公顷（100千克/公顷氮磷钾复合肥和50千克/公顷尿素）化肥的单产可达到1200千克/公顷。

调研期间埃塞芝麻已经收获完毕，从农场芝麻田和该中心晾晒的芝麻植株观察到，埃塞当前种植的品种均为分枝型，株高1米左右，茎秆细，单蒴（每叶腋结一个蒴果），结蒴性较差（上部结蒴稀疏，下部基本不结蒴），成熟后蒴果开口较大，抗倒伏能力弱，这些特征以及缺乏现代生产技术、非生物胁迫（反复干旱和高温）和生物因素（病虫害害）等共同导致埃塞芝麻单产较低（图10-2）。

Crop varieties released by Humera Agricultural Research Center (HuARC) from 2003 on wards							
Sn	Commodity	Variety	Year of released	Yield qt/ha		Oil content	Color
				research field	On farm		
1	Sesame	Setit-1	2003	7-10	5.5-9	52	White
		Humera -1	2003	8-10	5-8	54	White
		Setit -2	2016	7-11	6-8	53.7	White
		Setit -3	2017	9-12		54.4	white

Variety	Maturity	Altitude	Spacing		Seed rate kg/ha		Fertilizer /ha		De
			b/n rows (cm)	b/n plants (cm)	Row planting	Broad casting	DAP	UREA	of son g(e
Setit-1	80-90	600-800	40	10	0.8-1.2	2-3	100	50	3-3
Humera -1	90-100	600-1100	40	10	0.8-1.2	2-3	100	50	3-3
Setit -2	80-87	600-1100	40	10	0.8-1.2	2-3	100	50	3-3
Setit -3	75-80	600-1500	40	10	0.8-1.2	2-3	100	50	3-3



图 10-2 胡梅拉农业研究中心选育的芝麻品种

该中心的人员表示，研发新品种存在许多障碍。一是育种技术落后，仅采用系选方法，即从芝麻资源材料中经种植观察表现优良的直接用作品种进行利用，也可选择自然变异后代优良单株或株系，尚未涉及常规杂交、分子标记和基因组选择等现代技术，而且育种专家在这方面缺乏知识和技术。二是缺乏加代育种的温室等设施，每年只能在雨季种植一季进行育种选择，导致育种进程缓慢。三是实验条件落后，调研团参观了该中心的2个实验室，其中一个为1间房，有数粒仪、显微镜、微波炉、天平、烘箱等，另一个实验室为2间房，有木质结构实验台、离心机、化学分析仪等。实验室的仪器设备均来自援助项目，型号性能已老旧，因为没有科研项目经费支持，基本处于闲置状态且也已不可使用（图10-3）。

10.2.2 生产技术研发

为帮助农民提高芝麻生产力和质量，胡梅拉农业研究中心在农业部、EIAR、ATA的支持下，与荷兰开展了田间生产技术合作，总结了包含20个步骤的生产管理规范，覆盖从土地准备到收获后处理的芝麻生产全过程。主要措施包括：①播种方式：在播种环节，生产管理规范推荐条播（播种量为2～3千克/公顷）。但生产上绝大多数芝麻地都是撒播（种子用量4～12千克/公顷）粗放种植，不利于田间管理操作。②化肥施用：埃塞芝麻种植过程中化肥的使用很有限，埃塞负责农业的官员和大多数农民认为当地芝麻不使用化肥和农药，产品绿色有机，对生态友好。但同时他们对极少数施用一定量化肥（150千克/公顷）实现大幅增产的农户又大力推介，而大多农民是因为买不起或者无法及时购买到化肥才不施用。该中心对芝麻施用化肥种类、数量等试验研究尚未详细开展，只推荐了化肥使用量为100千克/公顷（N、P、K）和50千克/公顷尿素，没有对具体品种和种植区域提供针对性的参考。③病虫害防控：埃塞芝麻主要病害为白叶枯病、枯萎病和变叶病；主要虫害为芝麻蠕虫、瘿蚊、椿象和粉蚧。针对这些病虫害，研究机构没有进行防控药剂的筛选，缺乏有效的防控措施。④机械化：该中心也在研发适宜机械化的品种。该中心还表示，如果能够加强灌溉，产量可以得到大幅提升。

该中心表达了与中方加强芝麻全面科技合作的迫切愿望。该中心已有一名研究人员被埃塞政府选派到中国攻读博士学位；该中心芝麻项目负责人也曾在2019年到中国参加国际



图 10-3 胡梅拉农业研究中心实验室及品种筛选现场

芝麻学术交流会。该中心表示希望更多芝麻育种技术人员能到中国攻读研究生，学习芝麻育种相关技术。

10.3 投入品供给环节

10.3.1 种子供应

埃塞缺少专业的芝麻种子公司，农民自留是胡梅拉主产区的种子来源的主要方式。因使用的品种未经过提纯复壮，抗病、抗虫、抗逆能力较差，不仅产量低，而且易遭受病虫害灾害而导致产量损失 10%~20%。农民对优良品种的种子需求非常迫切。

种子的其他来源主要由胡梅拉农业研究中心提供，但是良种供应能力很小，远不能满足生产需要。该中心在开展育种和种植技术研发时，也对该中心选育的品种进行繁种，向农民出售种子，改良种子比自留种子的产量高 10%~20%。该中心拥有 200 公顷土地用于制种（不只种植芝麻，也种其他轮作作物），近 5 年生产了 189 吨改良的芝麻种子。胡梅拉地区只有 5.8% 的芝麻面积使用了改良的种子。

10.3.2 农资和生产服务供给

ATA 在全国设立了 100 多个农民服务中心，向各类农户、农场主提供农业服务、组织农户进行新技术培训，提供化肥、农药、生长调节剂、农具和种子等，向农户提供农机租赁服务，芝麻产业也可以获得相关支持。ATA 胡梅拉农民服务中心出售植物生长调节剂（生长素）、兽药（抗生素、抗寄生虫药等）和喷雾器，但没有用于芝麻生产的农资出售。

在农民服务中心询问售卖人员得知，无芝麻专用或兼用型农药，芝麻种植农户亦不曾购买农药用于病虫害防控。但该中心拥有意大利SFOGGIA播种机，已在芝麻播种时使用，播种效果较好，但应用面积很有限（图10-4）。



图 10-4 ATA 胡梅拉农民服务中心

10.4 田间生产环节

10.4.1 芝麻生产土地肥沃，缺少灌溉

与中国的芝麻主产区相比，胡梅拉地区土地肥沃，拥有大面积连片且地势平坦的耕地，非常适合发展机械化种植，土质属于黑土带沙性，灌水或雨后泥泞，干旱后板结，适墒期短（图10-5）。

埃塞芝麻主产区主要是旱作，没有田间排灌系统和设施，主要依赖雨水，因此，埃塞芝麻主产区因大面积干旱导致大幅减产时有发生。

10.4.2 埃塞芝麻生产组织化程度很高，但生产成本很高

埃塞芝麻生产的高度组织化给调研团留下了非常深刻的印象。埃塞种植芝麻主要有大中型农场和小农户种植两种模式并存。在生产规模方面，大型农场为1 000公顷以上，中等农场为100 ~ 1 000公顷，胡梅拉小农户户均耕地规模为5 ~ 10公顷。大中型农场主形成投资者联盟，小农户组织形成农民协会，联盟和协会向会员提供农资、农机和农业技术指导，并收购芝麻统一卖给ECX本地仓库。此外，各州政府利用政府基金成立国有农业公司。

调研团走访的提格雷州Hiwot农业公司是该州最大的一家国有农业公司。公司资本雄



图 10-5 胡梅拉平坦广袤肥沃的土地

厚，有 300 名固定员工，拥有 6 000 公顷土地、大量拖拉机等各种农用机械设备，采用机械化耕作模式生产棉花、芝麻、高粱等作物。该公司也同时是 ATA 的服务中心之一，可为周边地区提供农机服务等。该公司配备了灌溉设施，是埃塞国内领先的旱作雨养种植农场之一。公司芝麻种植面积为 2 000 ~ 3 000 公顷，品种为胡梅拉农业研究中心提供的改良品种 (Setit-1 和 Setit-2)，单产为 400 ~ 600 千克/公顷。公司负责人指出现有芝麻品种的产量不高，希望能引进中国的高产芝麻品种。虽然公司有大量农用机械，但是现有的播种机不适合播种芝麻。此外，现有的芝麻品种蒴果成熟时裂口大、易落粒，采用收割机收获产量损失大，迫切需要不落粒的芝麻品种，也没有适合收获芝麻的收割机。公司已经购买了意大利产的芝麻打捆机，准备在下个芝麻生产季进行机械收割打捆。当他听说中国有适合机收的芝麻品种、成熟的芝麻联合直播机械技术和联合收获技术，当即表示希望马上引进 (图 10-6)。



图 10-6 大型农场的农用机械

调研团还走访了Desta Group农场。该农场从350公顷开始发展，土地一部分从政府获得，一部分从周边农民租赁获得，现已发展为约1 400公顷土地的大型农场，有51名员工，其中2名技术人员。芝麻是其主要种植作物，每年至少安排其中700公顷土地种植芝麻，同时用高粱、绿豆、向日葵、芒果等其他作物进行轮作，2019年种植芝麻约1 000公顷，芒果60公顷，高粱250公顷（图10-7）。



图10-7 胡梅拉农场调研

种植的芝麻品种为胡梅拉农业研究中心提供的Setit-1、Setit-2、Setit-3、Humera-1，这些品种的本地最高纪录是800千克/公顷，在本农场的最高纪录是540千克/公顷，农场主期望达到的产量是800千克/公顷。芝麻生育期为90 ~ 120天，一般在6月中旬到7月中旬期间分期播种，10月初开始分期收获，到月底完成。在播种环节，有300公顷芝麻使用了机械播种，剩下的700公顷手工播种，合计约需51人日。在收获环节，需要大量人工，整个农场如果同时收获约需3 500人，连续工作7日。因芝麻用工季节性强，大量劳工需从其他地区前来生产地区，所需的交通、住宿等费用也拉高了其人工成本，播种工每人每天需100比尔，收获工每人每天需300比尔。对芝麻机械化生产技术，特别是机械化收获技术需求迫切（图10-8）。



图10-8 胡梅拉农场大田里的芝麻

农场主表示完善的灌溉设施和良好的田间管理对芝麻生产获得较高产量十分重要。但该农场缺乏芝麻大田灌溉设施，2019年因雨季推迟，芝麻生长前期发生严重干旱，中后期发生了虫害（虫子在叶片上结网，叶片包卷）和病害（茎点枯病），单产较正常年份下降66.7%，仅为180千克/公顷。农场收获的芝麻一部分直接卖给了ECX，一部分可以经ECX备案后卖给出口商，相比之下卖给ECX的效率更高。不同品种、不同等级可以卖出不同价格，2019年11月售价为42 000比尔/吨（折合约1 448美元/吨）。

调研团还走访了本地一家小农户协会。该协会有3 000个小农户成员，每户自有土地面积为5 ~ 20公顷，共拥有土地27 000公顷。协会下还设有80个生产小组，约25个农户组成1个小组，由农户民主选出1名组长和3名管理人员来组织统一播种、统一收获等共同生产活动。每个小组种植面积为65 ~ 125公顷，如租赁土地，价格为95比尔/（公顷·年）。芝麻单产普遍为300 ~ 700千克/公顷，在使用改良的种子、施用化肥（150千克/公顷）和加强种植管理后，有的小组获得了1 225千克/公顷的单产水平。芝麻大部分为人工种植，只有2 400公顷使用了机械化播种，有很强的农机需求，期望今后能够全面推广。政府向协会提供培训服务，提供一些贷款由协会进行分发，协会以折扣价优先给会员提供化肥等投入品，并以高于市场价15%收购芝麻。协会囤积芝麻一段时间后在价格较高时出售获利，保持协会运营并给会员分红。

从以上走访可以看出，田间生产环节最大的成本是人工支出，对芝麻生产机械化的需求非常迫切。

10.5 芝麻加工环节

据统计，埃塞有190多个具有许可证的芝麻出口商，其中也包括中国在埃塞注册的企业。但是只有极少数的公司设法提高芝麻附加值，进行初加工，例如加工去皮芝麻、清选芝麻进行出口，本次随团的传音公司已在埃塞新建了芝麻初选加工厂。目前，埃塞已建成的主要芝麻加工企业见表10-1。

表 10-1 埃塞现有芝麻加工厂

名称	工厂位置	营业范围	产能	出口目的地
Ambasel Trading House	阿姆哈拉州贡德尔 (Gondar)	脱皮芝麻和芝麻酱的生产与贸易	脱皮芝麻：2 200吨/年 烤芝麻：1 500吨/年 芝麻酱：900吨/年	脱皮芝麻和烤芝麻出口亚洲、欧洲的低关税国家；芝麻酱出口摩洛哥、埃及等北非和地中海国家
Krotaj	亚的斯亚贝巴格塔 (Geta) 工业园	芝麻酱生产与贸易	4 000吨/年	以色列、德国、美国、阿联酋、中东
Selete Hulling PLC		清选芝麻和带壳芝麻的生产与贸易	清选芝麻：840吨/年； 带壳芝麻：1 560吨/年	美国、荷兰、日本
Olera PLC		带壳芝麻和带壳烤芝麻的生产与贸易	带壳芝麻：1 800吨/年； 带壳烤芝麻：200吨/年	美国、荷兰、以色列

调研团走访了其中的Krotaj芝麻酱加工厂，该工厂以胡梅拉的优质芝麻为原料，采用德国进口的加工设备，年产芝麻酱4 000吨，主要出口中东市场。与出口芝麻原料相比，

出口每吨芝麻酱增加附加值约1 000美元。

Krotaj芝麻酱加工厂已通过ISO 22000认证,对生产过程的质量控制较严格,在加工厂实验室可以看到,对生产各个环节(清洗、脱皮、研磨等)都有取样检测。Krotaj对产品的营养成分(如脂肪酸成分、蛋白含量、钠、钙等)和客户要求的其他指标进行检测,但对危害因子(酸价、苯并芘等)没有进行检测。该厂采用了较先进的研磨设备,比国产芝麻酱研磨得更细腻,后期油酱分离情况较轻,放置3个月分离3%。Krotaj生产的芝麻酱制备过程中的炒籽温度为110℃,口感细腻,具有淡淡的清香,不属于浓郁型香味。

另外,据ATA介绍,Selet Hulling为埃塞芝麻的一级供应商。该公司为荷兰Tradin Organic公司在埃塞的子公司,有机芝麻来自埃塞北部地区,在亚的斯亚贝巴的自有加工厂进行去壳和清洗。其芝麻属于“t-85”或“Humera”品种,以其特有的白色、大个、甜甜的坚果味和香气而闻名。工厂总面积2 200平方米,包括原料仓库、芝麻清洗线、芝麻干脱壳线和成品仓库。芝麻去壳采用干法脱壳,能减少工厂的用水量,从而减少对环境的影响。

Selet的产品符合欧盟有机标准834/2007和889/2008、美国有机食品认证(NOP)、日本有机农业标准(JAS)等国际有机规则和法规。Selet与Control Union等国际有机认证机构建立了最佳工作关系。Selet根据HACCP和ISO 22000等国际质量体系运作,遵循集成的内部控制系统,所有产品都可以实现完全追溯。其样品测试在欧洲认可的实验室进行,内部质量在Selet自有的设备齐全的实验室进行检查和控制,对原材料从农场到工厂的运输、储存、加工和运送到客户进行完全控制。

10.6 市场交易环节

埃塞芝麻的市场组织成熟有序,调研团通过对ECX总部、地方交易中心和仓库的访谈,了解ECX的全过程运作内容。

10.6.1 埃塞国内芝麻市场交易模式

2011年11月,埃塞政府将芝麻纳入到商品交易中心(ECX)管理,实行拍卖交易制度。2019年,全国有ECX的23个分支机构,60个ECX仓库,347个会员,已建成3个电子交易中心,将于2020年和2021年各新增2个,总共建成7个电子交易中心(图10-9)。

农民协会、企业制农场可以通过ECX进行国内交易,ECX一般交易流程如下:

- (1) 芝农以生产小组为单位,统一将芝麻毛货交于合作社。
- (2) 合作社给芝农支付定金,收取芝麻毛货。

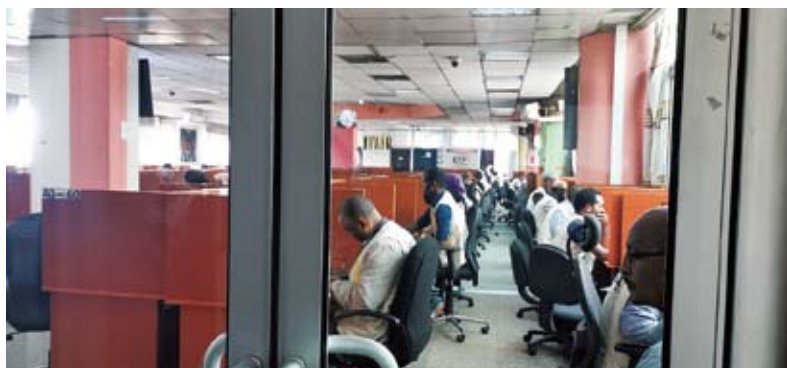




图 10-9 埃塞ECX交易场所

(3) 合作社将芝麻毛货交于ECX仓库存放，ECX出具发货单（详细注明货物所有人、车牌号、吨数、袋数）。

(4) ECX取样检测划分等级。调研团在胡梅拉ECX仓库查看了商品芝麻分级的整个工作流程。ECX仓库从取样到定级严谨有序，主要检测商品籽的异色率、含杂率、含水量等，并根据含杂率和异色种子率进行定级，然后进行登记，合作社领取登记号。

(5) 合作社在45天内择日凭登记号在ECX电子交易中心进行拍卖，每天仅10分钟集中交易时间，买卖双方出价和要价匹配时系统自动成交。

(6) 合作社向芝农支付尾款，并额外给农民补贴15%（图10-10）。



图 10-10 ECX胡梅拉仓库

10.6.2 埃塞芝麻出口交易模式

埃塞芝麻的主要出口渠道也是ECX，出口商在ECX平台竞拍成功后，安排物流将所拍芝麻从ECX仓库运往自己的工厂进行筛选加工，达到国际质量标准后发往国外。

为了维护国内芝农的利益和出口创汇，ECX对芝麻的定价主要依据国内的芝麻生产成本，但芝麻的低单产和高人工成本导致其生产成本高于国际市场。为了维护芝麻出口竞争力和商誉，埃塞政府多次出台政策进行调控，在调研团到访期间，政府刚出台了ECX新政策。具体如下：①工贸部每天向ECX交易平台发布国际参考价；②取消ECX T+1交易价 $\pm 6\%$ 浮动限制，允许ECX交易价格根据国际参考价格自由波动；③出口商的出口合同价格不得低于其在ECX拍卖所得成交价，触犯此条的出口商将被禁止ECX交易两周，第二次触犯将被禁止两个月，第三次触犯将被取消芝麻出口资质；④出口商必须向银行、ECX、海关提供出口合同进行备案核实；⑤对于在国际贸易中违约的出口商，取消芝麻出口资质。该新政出台后，埃塞芝麻出口价格有所下调，但仍然高于世界其他产区价格。

埃塞新政策允许农民协会、企业制农场、注册制合作社直接对外出口，不允许外资公司开展芝麻出口贸易业务，如果是外资芝麻加工企业，则允许将其产品自营出口，但仍然不允许自营出口芝麻原料。

10.7 中国在埃塞的相关工作

在埃塞期间，调研团还拜访了中国驻埃塞大使馆经参处和中国援埃塞农业专家组，组织了部分已在埃塞开展农业生产的中国投资者座谈。中国驻埃塞经参处表示非常支持双边的农业合作，愿充分调用相关资源予以支持。中国援埃塞农业专家和高级专家组已在埃塞持续工作多年，对埃塞的土壤、气候等农业发展条件已有较充分的认识，积累了丰富的经验，也表示愿积极予以技术分享和支持。如专家组建议，埃塞芝麻播种多在雨季进行，此时土壤黏性较大，翻耕的机械需要较强的硬度才能持久耐用。此外，农用机械在非洲的存放和保养条件较差，露天日晒雨淋易使零部件老化，因此应少使用易老化的橡胶部件。中国在埃塞的农业投资者则分享了在埃塞开展农业生产的经验和教训，帮助调研团更好地了解了双方合作的潜力和制约。

11 中国-埃塞芝麻产业合作潜力分析

近年来国际市场对芝麻的需求仍处于上涨趋势，但国际上强有力的竞争者不断涌现。本章从挖掘双方合作潜力的视角，总结埃塞芝麻的出口竞争力、主要优势、制约因素，构建合作模型，探讨埃塞与中国芝麻产业合作方向。

11.1 埃塞芝麻出口竞争力

埃塞芝麻近年来逐渐失去中国市场的最主要原因是生产成本高等因素^①导致了价格居高（图 11-1）。埃塞芝麻的价格近年来相比其他产区芝麻的价格一直处于高位，作为食品麻，其性价比弱于中国芝麻和苏丹芝麻；作为油麻，其性价比弱于坦桑尼亚、莫桑比克、乌干达芝麻。坦桑尼亚、莫桑比克、乌干达以及西非芝麻凭借性价比优势，出口中国的数量快速增长，并超越了埃塞对中国的出口量。

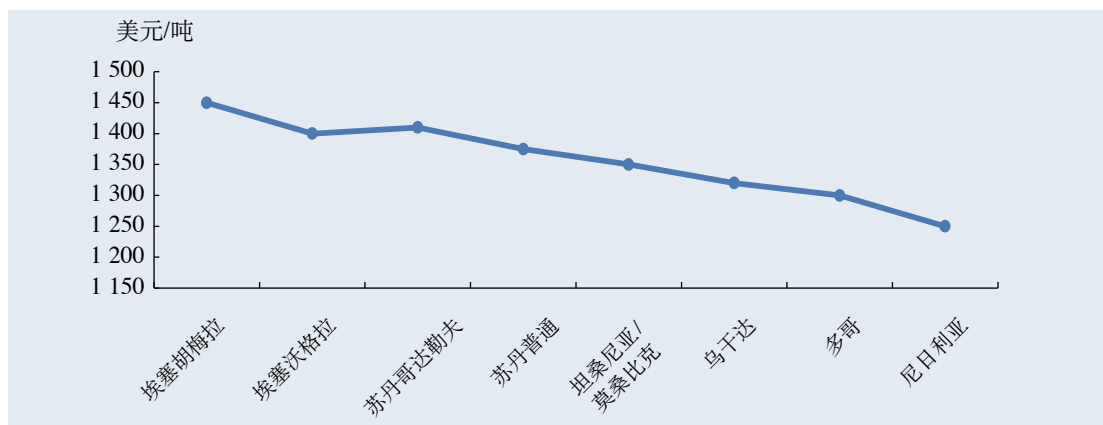


图 11-1 国际芝麻价格行情

数据来源：中国粮油商务网，查询时间 2020 年 5 月 9 日。

在 ECX 于 2019 年 11 月调整交易规则后，埃塞芝麻出口价格表现稳定，但相对其他国家芝麻依然处于高位，性价比劣势尚未出现根本性的改变。

11.2 埃塞芝麻产业价值链的主要优势

一是优良的芝麻品质。埃塞部分地区具有得天独厚的适宜芝麻生长的气候、土壤等自然条件，生产的芝麻品质优良，与中国最优质的白芝麻品质相当。其颗粒饱满均匀，色泽好，无异色粒，口感香甜，含油高达 51%~54%，烘焙后香味浓郁，既是上等食品麻也是上等油麻，其中，埃塞胡梅拉（Humera）白芝麻主要用于生产芝麻酱、生芝麻、炒芝麻；沃勒加（Wolega）白芝麻主要用于生产芝麻油和芝麻酱。

埃塞的白芝麻品质在中国芝麻市场广受好评，是中国很多芝麻香油厂和芝麻酱厂必不

^① 由于埃塞的外汇管制等因素，许多企业参与埃塞芝麻的国际贸易以换取外汇，推高了埃塞芝麻的国际价格，埃塞政府正积极推进相关改革措施。因其不属于芝麻生产领域的成本因素，本书不加以探讨。

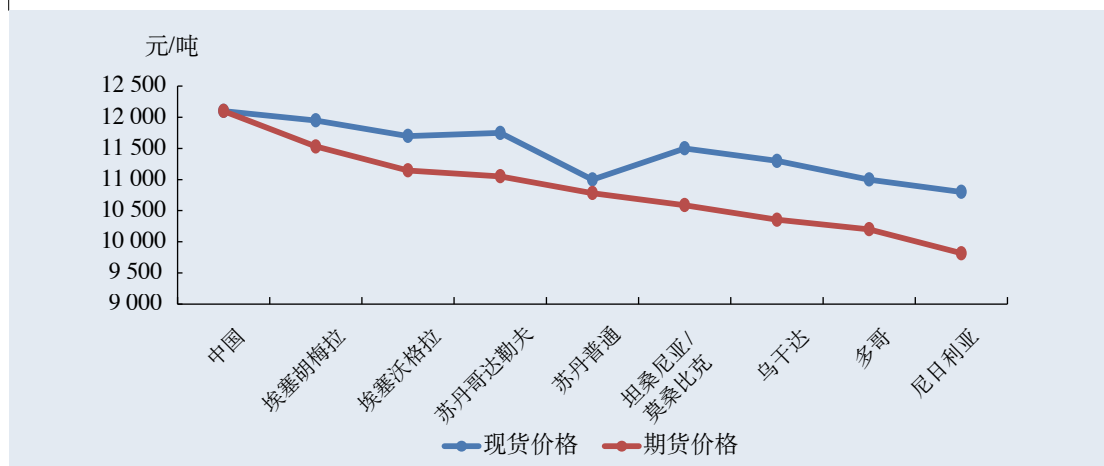


图 11-2 国际芝麻期货与港口现货价格对比

数据来源：中国粮油商务网，查询时间 2020 年 5 月 9 日。

可少的原料。部分中国芝麻加工厂已对以埃塞芝麻为原料的产品进行风味固化，拥有了稳定的客户群和市场份额。因此，对于一些工厂来说，埃塞芝麻具有不可替代性。

二是已构建基础研发体系。埃塞已构建包含国家农业科学研究院、国家芝麻研究中心、农业部芝麻技术指导站、胡梅拉农业研究中心等在内的研发体系，在芝麻种质资源、品种改良、农业机械化装备等方面具备了一定的科技基础。

三是成熟的生产组织体系。在埃塞政府的引导下，芝麻价值链的各利益相关者如小农户协会、大规模种植农场（公司）、农机公司、出口协会、ECX、ATA 服务中心、芝麻研究中心、农业部芝麻种植技术指导站，串起了一条组织化程度非常高的产业价值链，具有良好的规模化生产基础。

四是积极的政府行动。埃塞政府高度重视芝麻发展，制定了明确的发展战略，发展芝麻产业集群，建设相应的农业园区，扩展适宜芝麻种植的地区，改善 ECX 交易规则，积极营造良好的营商环境吸引外商投资。

11.3 埃塞芝麻价值链的制约因素

在第 7 章的制约因素基础上，调研团重点从双边合作角度，分析单产和种植成本的制约因素。

一是埃塞芝麻单产尚未充分发挥潜力。从主产区调研情况来看，小面积试验产量可达到 800 ~ 1 100 千克/公顷，大田单产为 400 ~ 600 千克/公顷，2018 年 FAO 统计的单产为 726 千克/公顷，高于世界平均水平 512 千克/公顷，也高于非洲其他芝麻主产国，但与中国 1 645 千克/公顷相比，仍有很大的提升空间。

埃塞芝麻的育种技术尚停留在初级阶段。中国实践经验表明，使用优良的芝麻品种对产量的贡献率可达 40% 以上。埃塞有相对庞大的芝麻种植规模，但种植领域科研投入和研发能力严重不足。当前主要采用的芝麻资源种植观察和系选育种尚停留在表型观察阶段，种植的品种产量低、抗性差，芝麻育种人员对常规杂交育种技术和分子育种技术等知识了解甚少。

埃塞芝麻的田间种植技术和管理均有很大的改善空间。埃塞已对施用化肥提高产量做了试验,但是对肥料种类、数量、配比等缺乏试验结果,缺乏高产栽培技术、肥水管理技术、病虫害旱害防控技术等的相关研发,由此也缺少相关农艺技术在田间生产时的应用。此外,农药、化肥等投入品非常有限;抵御灾害能力差,如遇干旱则容易遭受大幅减产。

二是芝麻生产人工成本居高不下,机械化应用较少。埃塞现有全人工和部分机械化操作两种模式,小农户基本以纯人工操作模式,大型农场用机械整地,其他环节基本是人工。芝麻的播种、除草、收获环节需要投入大量人工,特别是收获时需要在较短时间快速完成大面积收获,具有季节性,短时需从其他地区吸引大量劳动力,甚至抢劳动力,导致工价上涨。埃塞在芝麻机械化生产技术和农机装备研发方面,初步做了机播试验,效果较好,但因缺乏播种机,无法大面积推广。有的大农场已具备机械化基础,在整地等环节应用了机械,但其他环节缺少相应适宜的农机。

11.4 中国-埃塞芝麻产业价值链合作潜力

埃塞的芝麻产业困境核心之一在于低单产和高生产成本导致出口价格高昂。为更好发挥埃塞的芝麻生产比较优势和发展潜力,急需提高单产、降低生产成本,从而增强埃塞的芝麻出口竞争力、增加出口创汇、提高芝农收入。中国具有居于世界第一位的芝麻进口需求、先进的芝麻品种研发和机械化生产技术。以下基于实地调研获取的数据,构建不同假设条件下的芝麻合作模型。

11.4.1 生产环节的合作模型

假设1:农场芝麻种植面积1 000公顷,最主要的支出包括购买种子、机耕作业、播种用工、除草用工、收获用工(其他农机、农药、化肥等未计算入内)。

假设2:根据实地调研,大田生产单产为400~600千克/公顷,假设每公顷芝麻单产为500千克。

假设3:每吨芝麻售价为2019年11月的42 000比尔/吨,采用当时兑换美元的汇率29:1,折合约1 448美元/吨。

基于以上假设和实地调研收集的相关数据,构建的基础模型见表11-1,则1 000公顷芝麻农场的总收入为72.4万美元,农场净收入为30.8万美元,主要成本为416美元/公顷,折合每公顷净收入308美元或每吨616美元。

表 11-1 埃塞芝麻生产成本和收入基础模型

类别	编号	说明	数量	单位	价格	单位	金额(比尔)
成本 (按比 尔计 算)	1	机播:1.8~2.1千克/公顷; 300公顷	6 200	千克	50	比尔/千克	310 000
	2	人工播:4~12千克/公顷, 700公顷,约5 600千克					
	3	2 500 比尔/公顷	1 000	公顷	2 500	比尔/公顷	2 500 000
	4	共需51人	51	人日	100	比尔/人日	5 100
	5	19人日/公顷	19 000	人日	100	比尔/人日	1 900 000

(续)

类别	编号	说明	数量	单位	价格	单位	金额 (比尔)
成本 (按比 尔计 算)	收获用工	6 收获1公顷约需4人工作7天; 同时开收共需3500人,每人工 作7天,24500人日	24500	人日	300	比尔/人日, 另加计件 工资	7350000
	7	总成本 (=1+2+3+4+5+6)					12065100
	主要成本	8 每公顷成本 (=“7”/1000)	1000	公顷		比尔	12065
	9	每吨成本 (每公顷0.5吨产量) (=“8”×2)				比尔	24130
收益 (按比 尔计 算)	每公顷总收入	10 每公顷收获芝麻500千克, 售价 42000 比尔/吨	500	千克/ 公顷	42	比尔/千克	21000
	每公顷净收入	11 =“10”-“8”		公顷		比尔	8935
	农场总收入	12 =“10”×1000				比尔	21000000
	农场净收入	13 =“11”×1000				比尔	8935000
按面积 核算 (以美 元计)	每公顷总收入	14 =“10”/29				美元	724
	每公顷成本	15 =“8”/29				美元	416
	每公顷净收入	16 =“14”-“15”				美元	308
按数量 核算 (以美 元计)	每吨总收入	17 售价42000 比尔/吨				美元	1448
	每吨成本	18 =“9”/29				美元	832
	每吨净收入	19 =“17”-“18”				美元	616
按农场 核算 (以美 元计)	总收入	20 =“14”×1000				美元	724138
	主要成本	21 =“15”×1000				美元	416038
	净收入	22 =“16”×1000				美元	308100

基于此模型,通过中国埃塞芝麻产业价值链合作可产生相应成效,测算如下。

假设4:通过品种改良合作,联合研发适合耐瘠薄、抗病虫的品种,并开展田间管理技术合作,使单产提高20%,即模型中第10项单产达到600千克/公顷。

将假设4代入模型计算,则农场的每公顷成本仍为416美元,但每吨成本减少了16.7%,因增产后农场净收入为45.3万美元,比原模型增加47%,折合每吨净收入为755美元,比原模型增加22.6%(表11-2)。

表 11-2 埃塞芝麻生产成本和收入模型-假设提高单产

假设	类别	金额	基础模型金额	变化 (%)
假设4 单产提高20%达到 600千克/公顷	每公顷总收入 (美元/公顷)	869	724	20.0
	每公顷成本 (美元/公顷)	416	416	0.0
	每公顷净收入 (美元/公顷)	453	308	47.1
	每吨总收入 (美元/吨)	1448	1448	0.0
	每吨成本 (美元/吨)	693	832	-16.7
	每吨净收入 (美元/吨)	755	616	22.6

(续)

假设	类别	金额	基础模型金额	变化 (%)
假设4 单产提高20%达到 600千克/公顷	农场总收入 (美元)	868 966	724 138	20.0
	农场总成本 (美元)	416 038	416 038	0.0
	农场净收入 (美元)	452 928	308 100	47.0

假设5：通过芝麻机械化研发与应用合作，收获期人工投入成本即模型中第6项减少20%。

将假设5代入模型计算，农场总收入仍为72.4万美元，每公顷成本降为365美元，农场净收入为35.9万美元，比原模型增加16.6%，折合每吨净收入为718美元，比原模型增加16.5%（表11-3）。

表 11-3 埃塞芝麻生产成本和收入模型（假设降低成本）

假设	类别	金额	基础模型金额	变化 (%)
假设5 使用农 机减少 收获用 工20%	每公顷总收入 (美元/公顷)	724	724	0.0
	每公顷成本 (美元/公顷)	365	416	-12.3
	每公顷净收入 (美元/公顷)	359	308	16.6
	每吨总收入 (美元/吨)	1 448	1 448	0.0
	每吨成本 (美元/吨)	731	832	-12.1
	每吨净收入 (美元/吨)	718	616	16.6
	农场总收入 (美元)	724 138	724 138	0.0
	农场总成本 (美元)	365 348	416 038	-12.2
	农场净收入 (美元)	358 790	308 100	16.5

假设6：通过科技和田间管理合作、芝麻机械化研发与应用合作，同时实现了单产增加20%达到600千克/公顷，收获期人工投入量减少20%。

将假设6代入模型计算，则农场净收入为50.4万美元，比原模型增加63.5%，折合每吨净收入为839美元，比原模型增加36.2%（表11-4）。

表 11-4 埃塞芝麻生产成本和收入模型（假设提高单产且降低成本）

假设	类别	金额	基础模型金额	变化 (%)
假设6 单产增加20%达 到600千克/公 顷,使用农机减 少收获用工20%	每公顷总收入 (美元/公顷)	869	724	20.0
	每公顷成本 (美元/公顷)	365	416	-12.3
	每公顷净收入 (美元/公顷)	504	308	63.6
	每吨总收入 (美元/吨)	1 448	1 448	0.0
	每吨成本 (美元/吨)	609	832	-26.8
	每吨净收入 (美元/吨)	839	616	36.2
	农场总收入 (美元)	868 966	724 138	20.0
	农场总成本 (美元)	365 348	416 038	-12.2
	农场净收入 (美元)	503 617	308 100	63.5

假设7：多措并举。通过科技和田间管理合作、芝麻机械化研发与应用合作，同时实现了单产增加20%达到600千克/公顷，收获期人工投入量减少20%；此外，为增加国际市场竞争力，价格下降15%，降到36 000比尔/吨（原模型中第10项价格变动为36 000比尔/吨），折合约1 231美元/吨，与同期国际市场最低价格持平。

将假设7代入模型计算，则农场的主要成本为365美元/公顷，比原模型减少12.3%，农场净收入为37.9万美元，比原模型增加23.2%，折合每吨收入增加839美元，比原模型增加2.7%（表11-5）。

表 11-5 埃塞芝麻生产成本和收入模型（假设提高单产、降低成本并降低售价）

假设	类别	金额	基础模型金额	变化（%）
假设7 单产增加20% 达到600千克/ 公顷,使用农机 减少收获用工 20%,单价下降 15%	每公顷总收入（美元/公顷）	745	724	2.9
	每公顷成本（美元/公顷）	365	416	-12.3
	每公顷净收入（美元/公顷）	379	308	23.1
	每吨总收入（美元/吨）	1 241	1 448	-14.3
	每吨成本（美元/吨）	609	832	-26.8
	每吨净收入（美元/吨）	632	616	2.6
	农场总收入（美元）	744 828	724 138	2.9
	农场总成本（美元）	365 348	416 038	-12.2
	农场净收入（美元）	379 479	308 100	23.2

基于以上分析可见，通过双方合作，达到提高单产或者使用农机的单一目标，均可发挥积极效应。如果两个目标均达到，则即使降低15%的芝麻售价，农场的收益仍比现收益增加超过20%，而届时，因芝麻售价已与国际市场持平，又具有优良品质，埃塞芝麻的国际竞争力可得到显著提升。

需说明的是，该成本效益模型是简化模型，设置了多个假设条件，模型至少具有以下局限性：①一些投入成本如农机购置、农机作业等未计入在内，数量和单价均未进行不同情况的设定，且未采用变动汇率。②通过合作实际能提高的单产水平和降低成本的比例可能与假设的有较大不同。如根据专家测算，如果采用适合埃塞的高产品种，预计至少可达到700千克/公顷以上；如果在播种、除草、收获等主要环节都采用机械化生产，成本可降低30%以上。因此本模型仅作为研究参考。

11.4.2 芝麻深加工合作需等待时机

芝麻油加工厂的合作建设尚未能达到投资预期（表11-6），芝麻原料价格较高，按测算期42 000比尔/吨核算，生产芝麻毛油再出口到中国无成本优势；如果按五年平均原料价或者是降低原料成本后，假设达到29 000比尔/吨，才能出现投资机遇。

假设通过科技和田间管理合作、芝麻机械化研发与应用合作，实现了单产增加到700千克/公顷，同时收获期人工投入量减少20%。如果售价降到建设芝麻油厂的平衡价格29 000比尔/吨（原模型中第10项价格变动为29 000比尔/吨），折合约1 000美元/吨，达到表11-4中的原料价格，则收益如表11-7所示。此时农场净收入为33.4万美元，仍比原模型增加了8.6%。

表 11-6 中资在埃塞新建芝麻油加工厂的可行性测算（基于现有基础）

项目	值	Wolega或Humera 二级 按当前原料价格		Wolega或Humera 二级 按五年平均原料价格	
油厂原料采购价（比尔/千克）		42		29	
运输费（比尔/千克）					
原料到厂总成本（比尔/吨）		42 000		28 613	
卸货（比尔/吨）	12.50	13		13	
上清洗设备人工费（比尔/吨）		0		0	
除杂（比尔/吨）		1 050		858	
成品总成本（比尔）		43 063		29 484	
项目	值	毛油	芝麻饼	毛油	芝麻饼
成品出厂成本（比尔/吨）		100 134	7 185	69 620	7 185
工厂合理净利润	12.0%	12 016	862	8 354	862
成品出厂价（比尔/吨）		112 150	8 047	77 975	8 047
成品吉布提港成本（比尔/吨）		114 127	10 023	79 951	10 023
CIF芜湖港（人民币：元）	7.07	27 992	2 549	19 639	2 549
到中国芝麻油厂毛油成本（元）		30 937	3 154	21 771	3 154
中国芝麻毛油价格（元/吨）		25 900	3 100	23 260	3 100
埃塞生产成本优势（元/吨）		−5 037	−54	1 489	−54

数据来源：调研团专家测算。

表 11-7 中资在埃塞新建芝麻油加工厂的可行性测算（改变假设条件）

假设	类别	金额	基础模型金额	变化（%）
假设7 单产增加20% 达到700千克/ 公顷,使用农机 减少收获用工 20%,单价下降 15%	每公顷总收入（美元/公顷）	700	724	-3.3
	每公顷成本（美元/公顷）	365	416	-12.3
	每公顷净收入（美元/公顷）	335	308	8.8
	每吨总收入（美元/吨）	1 000	1 448	-30.9
	每吨成本（美元/吨）	522	832	-37.3
	每吨净收入（美元/吨）	478	616	-22.4
	农场总收入（美元）	700 000	724 138	-3.33
	农场总成本（美元）	365 348	416 038	-12.2
	农场净收入（美元）	334 652	308 100	8.6

12 中国-埃塞芝麻产业价值链合作建议

芝麻是埃塞最重要的创汇作物之一，而中国进口芝麻规模占全球芝麻贸易量的47%，虽然近两年来中国已不是埃塞芝麻第一大进口国，但埃塞芝麻一直是中国市场不可或缺的品种。

双方加强和扩大芝麻产业价值链全方位合作具有广阔的前景。埃塞拥有天赋的芝麻优质品质、广阔的适宜芝麻种植的土地资源、年轻勤劳的人民；中国拥有先进的芝麻生产技术、庞大的芝麻需求市场、积极勤奋的企业家资源。双方的合作将有助于推动提高埃塞芝麻单产、降低生产成本，助力提升埃塞的芝麻产量和国际竞争力，而中国市场可得到充足的、稳定的、优质的芝麻供应。

调研团在与埃塞芝麻产业价值链上主要利益相关者的交流过程中，强烈感受到了相关各方与中国科研机构和企业加强合作的殷切希望。双方经过充分交流，初步在芝麻品种改良、机械化技术和订单生产等方面达成合作共识。

12.1 合作目标

双方将致力于推动埃塞芝麻产业价值链的提升，为提高埃塞芝麻技术水平和产量以及出口创汇增加新动能，为中国及其他芝麻进口国供给优质原料，促进中国和埃塞两国在国际芝麻产业价值链中发挥更加积极的作用，实现优势互补。

12.2 合作思路

通过多种形式合作，分享中国芝麻产业价值链的发展经验，共同开展品种研发、联合开展农机装备研发，分享农艺措施，加强双边供需市场的直接对接，构建全价值链合作模式。

12.3 合作举措

一是建立合作机制。在政府层面，推动双边政府签订芝麻技术合作协议；在私营部门层面，筹划建立“中国-埃塞芝麻产业价值链国际联盟”。形成多维度的合作机制，两国的科研、种业、加工、种植、贸易、政府等跨界合作，共商中国-埃塞芝麻产业价值链发展，促进有利于两国芝麻价值链的延伸和发展，促进优势互补，互利共赢。

二是加强芝麻品种改良合作。提高埃塞芝麻产量和生产革命性飞跃的根本是加快埃塞芝麻品种改良和更新换代。双方科研机构联合围绕埃塞芝麻主产区关键科技问题开展研发，筛选和选育高产、高油、高蛋白、高芝麻素、抗旱、抗病虫、耐低营养、适合机械化的芝麻优良新品种，共享知识产权和分享利益。具体合作方式包括中国派高层次专家支持埃塞专家开展聚合育种、分子育种，从中国引进优良品种试种，共建芝麻遗传改良联合实验室（依托埃塞国家农科院或者胡梅拉农业研究中心），埃塞芝麻专家来中国进修学习等。两国的国家级芝麻科研机构可通过签署芝麻科技全面合作备忘录来明确合作内容，落实合作方案。

三是开展芝麻机械化生产技术和农机合作。中方派出中国科研专家和农机企业技术人

员，提供农机样机，与埃塞农机科研和技术人员联合研发和应用，共享知识产权和分享利益；在埃塞农科院研发基地或大型芝麻种植农场，开展机械化新技术示范和普及；埃塞方可派出技术人员到中国观摩学习。

四是发展双边订单农业。发展订单农业模式，由中方芝麻加工企业、芝麻育种专家团队、农业公司三方成立联合体，与埃塞大型农场开展订单农场合作。

以订单农场合作为基础和依托，在埃塞芝麻农场，融入双方的科研合作，种植双方共同研发的高产优质、适合机械化的芝麻品种，研发开展全程机械化生产模式，加强肥水科学管理，提高产量和品质，降低生产成本，稳定芝麻供给，建立长期的互惠互利合作模式。建立价格稳定机制，采用双方可共同接受的定价模式，如中方加工企业与埃塞企业制大型农场每年签订一次年度采购合同，按照前五年平均价确定合同价格，设定 $\pm 10\%$ 的调价机制，当市场价与合同价价差每大于 10% 时，价格调整 5% 。在此价格稳定机制下，双方可以有效避免因市场价格剧烈波动造成的损失，且不失公平，有利于建立长期稳固的合作关系，逐渐形成规模优势，为逐步建立芝麻全价值链合作建立良好的基础。

五是寻找多方资源共同支持。如盖茨基金会、世界银行、联合国国际贸易中心、非洲绿色发展联盟、双边发展合作的资金和技术支持。

12.4 建议与展望

一是建议埃塞政府在芝麻农业基础设施建设上加大投入，在惠农政策上加大力度，为引进国际芝麻农业技术和投资保驾护航。

二是建议埃塞政府进一步遵循市场规律，建立更加自由、开放的市场，增加企业制农场和合作社直接开展对外出口合作的机会，减少对外国公司参与埃塞芝麻收购与出口的限制。

三是建议埃塞政府加强对本国芝麻产业价值链的科技研发投入，与引进国际芝麻技术相结合、相互补充，通过创新驱动和产学研结合有力推动埃塞芝麻产业价值链提升。

附录1 埃塞工业园区开发商适用激励措施综合清单

1 财政激励

序号	激励措施综述	参考文献	参考文本								
	企业所得税免税期： (a) 对于工业园区开发商，自营业执照签发之日起15年内免税。 (b) 对于工业园区企业，具体行业所得税免征期最长为6年。此外，若企业用于出口或作为生产投入供应给出口商的产品比例达到60%，则额外享受免征所得税2年；若企业用于出口或作为生产投入供应给出口商的产品比例达到80%，则额外享受免征所得税4年。 注：工业园区企业（定义见《工业园区公告》）指在工业园区（简称“IP”）内投资从事制造活动或提供服务的投资者。	(a) 《为国内投资者保留投资激励和投资领域的2012年第270号投资鼓励条例》（经《为国内投资者保留投资激励和投资领域的第2014年第312号投资鼓励条例（修订版）》修订）《投资鼓励条例》，附表第21项。 (b) 《投资鼓励条例》第7条及附表	附表 投资领域和所得税免税 <table><tr><th>编号</th><th>投资领域</th><th>亚的斯亚贝巴或亚的斯亚贝巴周围的奥罗米亚特区</th><th>其他地区</th></tr><tr><td>1</td><td>1.21 工业开发区（包括在投资公告发布前获得政府同意设立私营工业开发区投资）</td><td>免征所得税10年</td><td>免征所得税15年</td></tr></table> 注：目前，为工业园区（IP）保留的地区属于“其他区域”，因此工业园区开发商有权享受所得税免税15年。 (b) 7. 产品或服务用于出口的投资者所享受的额外所得税免税 (1) 若投资者的产品或服务的超过60%用于出口或为出口商供应产品或服务，则除附表中规定的免税外，额外享受2年的所得税免税。 (2) 对于在工业开发区内投资的投资者，除本条第（1）款和本条所附附表的规定之外，若投资位于亚的斯亚贝巴或亚的斯亚贝巴周围的奥罗米亚特区的工业区，则享受2年所得税免税；若投资于位于其他地区的工业区，则享受4年免征所得税。前提是，该投资者制造的80%或以上的产品用于出口，或为产品用于出口的投资提供生产投入。 (3) 对于在发布投资公告前获得政府同意设立的私营工业开发区投资者（已经投资或计划投资），在满足本条第（2）款规定的条件后，可享受本条第（2）款规定的激励。 注：《投资鼓励条例》第7条规定的激励措施适用对象为在工业园区内投资的投资者。因此，上述的10年/15年所得税免税激励针对对象是工业园区开发商，而该项免税针对对象是在工业园区内进行投资的实际投资者，或工业园区理事会第417/2017号条例（《工业园法案》）中称为“工业园区企业”。	编号	投资领域	亚的斯亚贝巴或亚的斯亚贝巴周围的奥罗米亚特区	其他地区	1	1.21 工业开发区（包括在投资公告发布前获得政府同意设立私营工业开发区投资）	免征所得税10年	免征所得税15年
编号	投资领域	亚的斯亚贝巴或亚的斯亚贝巴周围的奥罗米亚特区	其他地区								
1	1.21 工业开发区（包括在投资公告发布前获得政府同意设立私营工业开发区投资）	免征所得税10年	免征所得税15年								

(续)

序号	激励措施综述	参考文献	参考文本
2	外派员工免征所得税：自营业执照签发之日起5年免征。 注：仅适用于园区内企业（不适用于园区开发商）	《工业园法案》第34条	34. 工资免税 工业园区出口型企业聘用的外籍员工，享受自企业获得营业执照之日起连续五年免征工资所得税。
3	亏损结转：结转5个所得税期间免税期内发生的亏损。	《投资鼓励条例》第12条	12. 亏损结转 (1) 若投资者在所得税免税期间发生亏损，期满后可持续免税优惠，获得免税期的一半。 (2) 尽管有本条第(1)款的规定，为计算亏损结转期，应将半年期视为一个完整所得税期。 (3) 尽管有本条第(1)款和第(2)款的规定，在所得税免税期间发生亏损的投资者不得将此亏损递延超过五个所得税期。 注：因此，工业园区开发商可在15个所得税免税期到期后，结转5个所得税期。
4	资本货物、建筑材料、配件和备件以及车辆免税。	《投资鼓励条例》第13条第(1)款和第(2)款 第06/2017号《埃塞俄比亚投资工业园区理事会指令》第10条第(2)款，与第10条第(1)(h)款结合阅读；第40条（针对企业）（“工业园区指令”）	13. 资本货物和建筑材料免征关税 (1) 除附表第7、11、14和15号所列投资领域外，任何从事本协议附表所列投资领域的投资者，均可免税进口新建企业或扩大或升级现有企业所需的资本货物和建筑材料。 (2) 为实施本条第(1)款，投资者应提前提交免税进口的资本货物和建筑材料清单，并获得相应投资机构批准。 10. 工业园区开发商协议及关税和免税 (1) EIC与工业园区开发商签订的协议至少应包括： a. 协议的目的或主题； b. 待开发土地的确切地理边界； c. 财政、社会和环境保护义务； d. 施工时间表，包括项目施工的开工和竣工时间； e. 防止将土地用于非预期用途和转让未开发土地的规定； f. 确保建筑周边安全性的措施； g. 园区开发过程中建造的临时职工宿舍、食堂和办公室建设标准和期限；

(续)

序号	激励措施综述	参考文献	参考文本
			h. 免税进口项目清单： ■ 基础设施（道路、电力、电信、水、废水处理、后勤、安保、消防及相关基础设施施工机械和材料）； ■ 建筑结构设计和必要的建筑材料； ■ 资本货物； ■ 配件； ■ 备件； ■ 软件； ■ 指令或埃塞俄比亚投资理事会规定允许的机动车辆； ■ 个人物品； ■ 原材料； ■ 消耗性实验室和设计材料； ■ 安全和健康相关材料，如认为必要并免费发放给工人的药品； ■ 用于包装和进口各种货物的容器。 i. 《第886/2015号工业园区公告》、《工业园法案》、本指令或其他相关法律中未明确规定缔约方的任何其他权利和义务。 (2) EIC应根据本条第1(h)款所列清单，准许工业园区开发商进口免税货物。
4	资本货物、建筑材料、配件和备件以及车辆免税。	《投资鼓励条例》第13条第(1)款和第(2)款 第06/2017号《埃塞俄比亚投资工业园区理事会议令》第10条第(2)款，与第10条第(1)(h)款结合阅读；第40条（针对企业）（“工业园区指令”）	40. 提供机械备件和更换配件的条件 (1) 境内外投资者可免税持有机械零部件和更换配件的库存，并向工业园区内企业供应，但向工业园区外的制造企业销售机械零部件和更换配件的，应依法缴纳相应的关税和税款。 (2) 本条第(1)款所述机械备件和更换配件的库存仅能存放在该企业和税务署共同控制的工业园区内的保税仓库中。
5	进口车辆免征关税（2辆SUV和3辆混合动力SUV/混合动力汽车）。	《投资鼓励条例》第14条 《埃塞俄比亚投资理事会议令》（2017年9月）（《理事会议令》）第8节	《投资鼓励条例》 14. 机动车免征关税 全部或部分免除机动车关税应由EIC根据投资项目的类型和性质发布的指令确定。 《理事会议令》 8. 工业园区内投资者进口免税机动车辆 理事会决定： 8.1 工业园区开发商以及工业园区企业（包括资产2亿比尔以下的中小企业/实体）可免税进口SUV（越野车或其他品牌）机动车两辆，该进口车辆为开发商/企业所有； 8.2 工业园区开发商以及工业园区企业（包括资产低于2亿比尔的中小企业/实体）可免税进口混合动力SUV机动车三辆，该进口车辆为开发商/企业所有（据了解，理事会作出决定之日，混合动力SUV制造技术尚未启动，因此混合动力汽车可视为“混合动力SUV”标准）。

(续)

序号	激励措施综述	参考文献	参考文本
6	在满足法律规定条件的前提下,商业生产所需原材料的进口方面,有多项不同的关税激励计划可供采用		a) 5. 关税退还计划 (1) “商品出口商或商品出口商的供应商”对进口或在当地或购买的货物支付的税费,在符合财政部即将颁布的指令规定的条件后,应予以返还。
	a) 关税退还计划;		b)
	b) 凭证计划;		10. 凭证计划采用程序 (2) “已取得贸易和工业部颁发的资格证书”的商品出口商或商品出口商的供应商,可在凭证簿上记录其进出口货物的应缴税额后提货。
	c) 保税出口工厂计划;	第768/2012号《出口贸易关税激励计划公告》第5条	c) 12. 保税出口工厂计划申请程序
	d) 保税出口制造仓库计划;	第(1)款、第10条第(2)款、第12条第(1)款、第16条第(1)款、第18条第(1)款和第14条第(1)款	(1) 由“专门从事出口商品生产、已取得贸易和工业部颁发的资格证书,并拥有符合税务署规定标准的制造仓库的人员”进口的原材料,应运至海关监管的工厂,不需缴纳关税。
	e) 保税投入品供应物料仓库计划;		d) 16. 保税出口制造仓库计划申请程序 (1) 由“专门从事出口商品生产、已取得贸易和工业部颁发的资格证书,并拥有符合税务署规定标准的制造仓库的生产者”进口的原材料,应运至海关监管的制造仓库,不需缴纳关税。
7	注:请注意,开发商和企业一般免征关税,以上规定适用于可能出现的开发商或出口商有义务缴纳关税的特殊情况。		e) 18. 保税投入品供应物料仓库计划申请程序 (1) 由“已取得贸易和工业部颁发的资格证书,并拥有符合税务署规定标准的仓库的人员”进口的投入品供应物料,应从海关进口运至海关监管的仓库,不需缴纳关税。
	土地租赁:长期土地租赁持有相关安排	根据该地区法律,奥罗米亚土地利用和管理法。	14. 计划实施程序 (2) 由工业园区计划受益人进口的原材料,应从海关进口运至海关监管的工厂,不需缴纳关税。

2 非财政激励

序号	激励措施概述	参考文献	参考文本
			投资公告
			20. 汇款
			1) 任何外国投资者有权就其投资，按汇款当日的现行汇率，将下列款项和收益以外币形式（可兑换外币）汇出埃塞俄比亚：
			(a) 投资收益和股息；
			(b) 对外贷款本息支付；
			(c) 与根据本公告第15条“技术转让协议”登记的技术转让协议有关的付款；
			(d) 根据本公告第16条“外国企业无出资出口贸易合作协议”登记的与合作协议有关的付款；
			(e) 转让股份或者将企业部分或者全部所有权转让给其他投资者所得的收益；
			(f) 企业出售、减资、清算所得；以及
			(g) 根据本公告第19条第(2)款向投资者支付的补偿。
			2) 尽管有本条第(1)款的规定，与外国投资者共同投资的国内投资者不得将投资所得资金汇出埃塞俄比亚。
			3) 根据本公告进行投资活动所聘用的外籍员工，若其永久居住在埃塞俄比亚境外，则可根据适用法律，按照汇款当日的现行汇率，将其雇佣所得的工资以外币形式（可兑换外币）汇出埃塞俄比亚境外。
			注：第1条第(d)款规定的内容涉及国内投资者签订的合作协议，因此不适用于外国投资者。
			工业园区公告
			21. 适用外汇规定
			受国家法律管辖的工业园区开发商、工业园区经营者、工业园区企业应：
			1) 有权向境外银行和境内金融机构贷款；
			2) 有权将其股票、债券和其他有价证券在境外证券市场上市；
			3) 根据投资公告第1180/2020号第20条第(1)款第(a)至(g)款规定，有权按照汇款当日的现行汇率进行外币（可兑换外币）汇款；具体汇款规定应在条例中体现。
			外币透明度指令
			6. 外汇分配和优先事项
			6.1 银行在分配外币时，应当优先考虑下列进口项目和款项，遵循先到先得原则。
1	有权通过下列方式从埃塞俄比亚向境外汇款外币（可兑换外币）： a) 利润和股息； b) 对外贷款本金和利息支付； c) 与已登记的技术转让协议有关的付款（如有）； d) 企业出售、减资、清算所得； e) 根据征收法向投资者支付的补偿；以及 f) 将企业股份或部分所有权出售或转让给另一投资者所得的收益。	第1180/2020号 《投资公告》（“投资公告”）第20条。第886/2015号《工业园区公告》（“工业园区公告”）第21条第FXD/46/2017号《外汇分配和外汇管理透明度指令》（“外币透明度指令”）第6条	

(续)

序号	激励措施概述	参考文献	参考文本
1	外国投资者可获得外汇的项目：a) 优先返还其利润和股息；以及企业出售或清算所得的收益以及支付补偿；(b) 根据需要提供外部贷款和供应信贷的本金和利息，无需登记。 外籍员工可根据需要获得外币，用于其工资转移。 制造商可优先获得外币，用于采购机械、设备、零件、原材料和配件。	第1180/2020号《投资公告》(“投资公告”)第20条。第886/2015号《工业园区公告》(“工业园区公告”)第21条第FXD/46/2017号《外汇分配和外汇管理透明度指令》(“外币透明度指令”)第6条	v) 制造业要求采购机械、设备、零部件、原材料和配件；..... x) 利润和股息转移..... xi) 外国直接投资 (FDI) 出售股份和清算企业 6.2 按需售汇 本条所列项目免除第6.1款规定的登记程序，并按需提供。 iv) 埃塞俄比亚国家银行授权付款： a. 外债支付义务，即本金利息和费用； b. 供应商信用 v) 外籍员工的工资转移。
2	快速签证程序：为在工业园区工作的外国人及其家属办理入境签证、工作许可证和居留证的快速程序； 为工业园区投资者提供更好的签证条件——为工业园区开发商或企业的所有者或股东提供有效期为五年的多次入境签证。 为在工业园区工作的外国运营商、工业园区产品采购商、工人、经理、总部高管、董事会成员或高级专业人员提供有效期为三年的多次入境签证。	《投资公告》第23条 (第1、2、3、4、6款) 《工业园法案》第16条和第17条	投资鼓励公告 23. 签证服务 1) EIC 或委托投资机构可协助处理为投资目的来到埃塞俄比亚的外国人以及在埃塞俄比亚投资的投资者的家属 (配偶、子女和父母) 的签证申请。 2) 对于有意进入埃塞俄比亚进行投资，但申请的国家签证非其本国签证的个人，可凭EIC的支持信在该第三国为其签发签证。 3) 根据本公告进行投资的所有人或股东，经EIC确认后，可获得有效期为五年的多次入境签证。 4) 根据本公告进行投资的企业最高管理层，以及该企业的母公司或控股公司的最高管理层，经EIC确认后，可获得有效期为三年的多次入境签证。 5) 6) EIC 应与移民、国籍和重大事件局以及其他相关政府机构合作，以妥善执行本条规定。 工业园法案 16. 签证和居留许可 1) EIC可协助处理来埃塞俄比亚的外国公民及其依靠家属的投资签证和居留许可申请。 2) 对于身处居住国以外的外国公民，若其前往埃塞俄比亚的目的为投资，则可从现居的第三国申请埃塞俄比亚签证。 3) 根据EIC的保证，可向工业园区开发商或企业的所有者或股东签发有效期为5 (五) 年的多次入境签证或居留许可。 4) 根据EIC的保证，可向在工业园区工作的外国运营商、工业园区产品采购商、工人、经理、总部执行官、董事会成员或高级专业人员签发有效期为3 (三) 年的多次入境签证或居留许可。 17. 工作许可证签发 1) EIC应向已获得工业园区投资许可证的工业园区开发商、经营者或企业雇佣的外国公民签发工作许可证。 2) 可向居住在埃塞俄比亚的工业园区外籍工作人员的配偶签发工作许可证。

(续)

序号	激励措施概述	参考文献	参考文本
			工业园区公告
			2. 定义 在本公告中，除非上下文另有规定要求： 1) “工业园区海关监管区” 指属于工业园区一部分、海关有权监管，但被视为在关税区之外的区域。 工业园法案
			19. 海关监管 1) 所有海关手续应在工业园区内完成。 2) 工业园区可全部或部分为海关监管区。 3) 与工业园区有关的海关监管应在关境的出入境关口以及工业园区的出入口处进行。 4) 在工业园区开发者、经营者、企业和工业园区海关监管区之间运输往来的货物，应当简化海关手续办理通关手续。 5) 工业园区企业自进境口岸运往工业园区的货物，途中不得拦截、查验。但是，货物应密封装于集装箱内，并在装运单据上清楚标明货物的目的地工业园区。 6) 对承诺出口全部产品的工业园区企业免征其可能进口的原材料的关税和税款；但是，工业园区企业将部分产品销往关税区的，应就差额征收相应的关税和税款。 7) 工业园区企业将其产品作为投入品销售给其他产品用于出口的工业园区企业，免征关税和税款。 8) 关境内企业向从事出口的工业园区企业提供境内生产的投入品，该投入品免征关税和税款。 9) 承诺全部产品用于出口的工业园区企业，其进口原材料可最多储存一年，免征关税和税款。若该企业有合理理由将此类原材料储存超过一年，EIC 可给予额外储存时间。 10) 承诺出口其全部产品的工业园区企业，在任何情况下均不得在关税区内销售其产品；但在特殊情况下，经埃塞俄比亚投资理事会授权后，可在关税区内销售其产品，但须缴纳适当的关税和税款。 11) 工业园区企业按要求需将其全部产品出口，但提供证明其产品未达到出口标准或产品因缺陷在出口被退回的： (a) 获得EIC 批准后，可在特定销售活动上销售这些产品，该销售活动每年举办两次，每次活动持续不超过一周，举办地点在工业园区内指定地点，需缴纳增值税；或 (b) 可将这些产品捐赠给合法设立的国内慈善机构； (c) 采用其他方法处理掉这些产品。 12) 工业园区企业在关境内销售副产品，只需缴纳增值税。企业应缴增值税数额按照销售副产品的价格计算。 13) 工业园区开发者或企业需向税务署出具保证函，将有瑕疵、损坏或残缺的资本货物、零配件运送出境进行更换或修理；税务署不得对此要求任何费用。 14) 对工业园区开发者或企业在指定处货款交换的进口货物免征关税或税款，同时工业园区开发者或企业可在获得当局许可后将此类货物运往境外，无需缴纳与发回境外的货物有关的费用。 15) 工业园区企业可向税务署提供有关政府机构出示的证明，将过期或有缺陷的投入品移除。
3	通关便利：通过保税仓库或凭单计划将进口原材料从海关直接运输至工厂。 该法规具体包括：(1) 在工业园区内完成的所有海关手续；(2) 部分或全部为海关监管区的工业园区；以及(3) 应按照简化的海关手续办理通关手续的由工业园区开发者或企业运输的货物，或者进出该工业园区海关监管区的货物。 工业园区开发者也可将有缺陷、损坏或不完整的资本货物、备件和配件运到境外以进行更换或修理，无需向税务署支付任何费用。 对于企业：若工业园区企业承诺出口全部产品，或将其产品作为投入品销售给其他产品用于出口的工业园区企业，则对其可能进口的原材料免征关税和其他税收。	《工业园法案》第19条 《工业园区公告》第2条第(22)款定义 第859/2014号《海关公告》(“海关公告”)第84-88条(简化客户程序)	

(续)

序号	激励措施概述	参考文献	参考文本
3	通关便利：通过保税仓库或凭单计划将进口原材料从海关直接运输至工厂。 该法规具体包括：(1) 在工业园区内完成的所有海关手续；(2) 部分或全部为海关监管区的工业园区；以及(3) 应按照简化的海关手续办理通关手续的由工业园区开发商或企业运输的货物，或者进出该工业园区海关监管区的货物。 工业园区开发商也可将有不缺陷、损坏或不完整的资本货物、备件和配件运到境外以进行更换或修理，无需向税务署支付任何费用。 对于企业：若工业园区企业承诺出口全部产品，或将其产品作为投入品销售给其他产品用于出口的工业园区企业，则对其可能进口的原材料免征关税和其他税收。	《工业园法案》第19条 《工业园区公告》第2条第(22)款定义 第859/2014号《海关公告》(“海关公告”)第84-88条(简化客户程序)	海关公告 第十三章 简化海关手续 84. 获授权人员 1) 在符合税务署规定的标准的情况下，应允许对特定的已注册的人员适用简化海关程序。 2) 税务署在制定获授权人员的人选标准时，应特别考虑出口商和制造商。 85. 货物申报简化程序 货物申报的简化程序可包括以下内容： 1) 提供确认货物和允许随后完成最终货物申报所需信息的最低要求后，放行货物； 2) 对于由同一人员经常进出口的货物，允许在一定时期内对所有进出口货物进行统一申报； 3) 允许通过在被授权人的记录中录入条目的方式提交货物申报单，随后提供补充货物申报作为支持材料。 86. 货物清关的简化程序 货物清关的简化程序应包括允许在报关人的营业场所或税务署授权的其他地方清关货物的程序。 87. 关税和纳税义务的自我评估 税务署可允许使用被授权人的商业记录自我评估关税和税务责任，并在适当情况下确保符合其他海关要求。 88. 基于审计的海关监管 税务署应采用基于审计的海关监管办法，通过审查被授权人持有的有关账簿、记录、业务系统和商业数据，确认简化货物申报的准确性和真实性以及是否符合其他海关要求。
4	防止征收保障：保证不采取征收或国有化措施；只在符合法律要求和非歧视的基础上进行征收；为公共利益目的征收或国有化时，提前支付与投资性房地产的现行市场价值相应的合理补偿。	《工业园区公告》第20条 《投资公告》第19条	工业园区公告 20. 保障与保护 1) 除因公共利益需要之外，不得征用工业园区投资。若因公共利益需要进行征用，须立即支付合理补偿。 2) 若投资者为外国投资者，赔偿金应以国际金融市场上的任何可兑换货币支付。 3) 对于非法征收的情况，工业园区开发商、工业园区经营者、工业园区企业有权收回其资产或投资，并按违法征收之日起合理计算利息，直至归还。 4) 有关征用的方式以及构成非法征用、补偿和归还的内容，适用相应法律的规定。

(续)

序号	激励措施概述	参考文献	参考文献
4	防止征收保障：保证不采取征收或国有化措施；只在符合法律要求和非歧视的基础上进行征收；为公共利益目的征收或国有化时，提前支付与投资性房地产的现行市场价值相应的合理补偿。	《工业园区公告》第20条	投资公告
		《投资公告》第19条	19. 投资担保与保护 1) 政府可根据法律要求，在非歧视的基础上，为公共利益目的征收根据本公告进行的任何投资。 2) 若根据本条第(1)款征用投资，应提前支付与现行市场价值相应的合理补偿。
5	不动产所有权：外国投资者有权拥有投资所需的住宅和其他不动产（不包括土地）。款)	《投资公告》第18条（第1款和第2款）	18. 不动产所有权 1) 尽管有《民法典》第390至393条的规定，外国投资者或被视为国内投资者的外国国民应有权拥有其投资所需的不动产。本规定所称不动产不包括土地。 2) 尽管有《民法典》第390至393条的规定，外国投资者或被视为国内投资者的外国国民，若拥有大规模投资，则可拥有一套住房。实施本规定所需的详细条件应由专项法规规定。
		按消费者类别划分的电价修正研究	
6	水电费补贴：为制造业提供的水电费补贴： a) 电力按相关机构确定的费率出售； b) 工业园区内电力供应可靠——政府为园区提供专用发电站。	电价收费标准	收费标准修正
			收费类型
			截至2020年12月 比尔/千瓦时
			截至2021年12月 比尔/千瓦时
			1. 住宅收费分段
			2. 一般性收费
			2.1 统一费率
			2.124 0
			3. 低压工业电价
			3.1 统一费率
			1.292 7
			3.2 按需收费率
			150.000 0
			4. 中压工业电价。15 千伏和 33 千伏
			4.1 统一费率
			0.996 9
			4.2 按需收费率
			110.655 0
			5. 高压工业电价。66 千伏以上
			5.1 统一费率
			0.791 1
			5.2 按需收费率
			65.730 0
			6. 路灯收费
			6.1 统一费率
			1.761 1
			7. 大宗供应收费
			7.1 每千瓦需求费率
			117.872 3
			7.2 发电电价。每月每千瓦时
			0.665 3
			157.160 0
			0.887 0

(续)

序号	激励措施概述	参考文献	参考文本
7	有权开立和经营外币账户；外国投资者有权在经授权的当地银行开立和经营外币账户 出口商同时有权在经授权的当地银行开立和经营外汇保留账户。	《工业园区公告》第21条 《投资公告》第21条 第FXD 48/2017号《保留和利用出口收入和汇入汇款指令》（“保留指令”）	有关《工业园区公告》的详细信息，请参阅本非财政激励表中的第1项，如上所示。 投资公告 21. 对外贷款及外币账户 1) 任何投资者均可根据埃塞俄比亚国家银行的适用指令为其投资获得外部贷款。 2) 根据埃塞俄比亚国家银行的适用指令，任何投资者均可在埃塞俄比亚的银行开设外币账户，以进行投资。 保留指令 第三条 开立外汇保留账户 经授权的银行可以为符合条件的货物和服务出口商以及汇入汇款开立外汇保留账户。
8	在取得营业执照前进口原材料。免税原材料和资本货物的进口权，不仅适用于项目实施阶段（即投资者开始商业运营），且适用于项目建设阶段的培训和测试目的使用。	《理事会综合指令》第2.1节	2. 试点产品原材料免税进口 埃塞俄比亚投资理事会决定，允许制造商在获得营业执照之前进口： 2.1 生产中试产品的原材料。因为中试产品被视为工人培训用品，且由于此类产品可能存在产品缺陷，因此大部分无法销售；免征关税。
9	允许外籍人员开立和经营外币账户。 允许投资者在园区区内进行外币交易。 允许投资者用外币支付外籍员工的工资，并直接记入员工的外币账户。	第FXD/59/2019号《工业园区外汇交易指令》第4条和第5条	第四条 外币购销原材料 4.1 投资者可以从使用外币和/或保留账户购买同一工业园区内或另一工业园区内的其他投资者制造的原材料或投入品。 4.2 投资者可以使用外币将其在工业园区内的制成品作为投入品出售给同一工业园区内或另一工业园区内的其他投资者，外币记入其保留账户。 第五条 向工业园区外籍员工开立外币账户 5.1 投资者可从其保留账户或外币账户以外币支付其外籍员工的工资。 5.2 允许工业园区外籍员工凭申请书、工作许可证、居民身份证、月薪用外币支付的劳动合同，在园区内银行开立外币账户。 5.3 外籍员工的外币账户应记入其每月净薪金的最高限额，但不包括任何其他福利，包括但不限于免费食宿酬金和累积假期工资。 5.4 外籍员工可随时将其外币账户资金转往境外或转为比尔。

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序号	激励措施概述	参考文献	参考文献
	特例允许生产服装配件的工业园区企业； a) 通过合同接续的方式，采用“切割-制造-修整”方法；以及 b) 在符合所附条件的前提下，向另一家产品出口的企业进口和销售配件。	《工业园区指令》 第35条和第36条	第八节 关于纺织品和服装的特别规定
10	35) 使用合同接续方式 工业园区内从事纺织服装生产的企业，可以通过合同接续的方式，获得易裁服装的供应，并按照国外采购商提供的设计和标准制作、裁剪成衣。 36) 进口服装配件 1) 生产服装配件的企业，可以进口此类配件，或将配件销售给出口产品的工业园区企业。 2) 本条第一款规定的生产服装配件的企业，应依法取得投资许可证。 3) 对于本条第一款规定的生产服装配件的企业，要取得投资许可证，则应提交明确的开工计划，包括： a) 在第一年生产至少一种产品；以及 b) 提交一份具体计划，说明该企业将在五年内开始其他产品的全面生产，并就此与EIC达成协议。		

3 埃塞俄比亚投资委员会 (EIC) 一站式服务

序号	激励措施综述	参考文献	参考文献
	a) 签发投资许可证； b) 签发营业执照； c) 商业登记证； d) 签发工作许可证； e) 注册商号或商号； f) 技术转让协议； g) 组织大纲、章程公证； h) 免除关税； i) 签发税务识别号 (TIN)； j) 工业园区通关； k) 银行服务。 埃塞俄比亚投资委员会提供上述 (a) 至 (i) 项的所有服务，但同时工业园区也将受益于园区内的清关、银行业务和其他基本服务。	《投资公告》 第24条 《投资公告》 第24条 《工业园法案》 第15条 《工业园区指令》 第23条和 第24条	投资公告 24. 一站式服务 1) EIC 应向其根据本公告签发投资许可证的投资者提供一站式服务；委员会应协调相关机构并同步其日常职能。 2) 地区/州投资机构应根据适用的联邦和地区/州法律向其签发投资许可证的投资者提供一站式服务。 工业园区指令 15. 一站式服务点服务 1) 已获得EIC 签发投资许可证的工业园区开发商、运营商或企业应在获得以下一站式服务点服务 (园区水平)： (a) 更新、修改、变更、更换投资许可证或者为扩大投资项目签发投资许可证； (b) 变更、修改商事登记或者签发商业登记替代证书； (c) 签发、更新营业执照或者签发营业执照替代执照； (d) 商业组织名称的修改或变更； (e) 商号注册、提供替代商号、商号证书的修改或注销；
1			第五节 一站式服务点服务及相关事宜

(续)

序号	激励措施综述	参考文献	参考文本
1	a) 签发投资许可证； b) 签发营业执照； c) 商业登记证； d) 签发工作许可证； e) 注册商号或商号； f) 技术转让协议； g) 组织大纲、章程公证； h) 免除关税； i) 签发税务识别号 (TIN)； j) 工业园区通关； k) 银行服务。 埃塞俄比亚投资委员会提供上述 (a) 至 (i) 项的所有服务，但同时工业园区也将受益于园区内的清关、银行业务和其他基本服务。	《投资公告》第24条 《工业园法案》第15条 《工业园区指令》第23条和第24条	(f) 工业园区企业联合会的登记和更新登记； (g) 外国直接资本登记； (h) 签发的签发和续签，居住证的签发和续签； (i) 工作许可证的签发、更新、更换和注销； (j) 批准免除进口货物的关税和价值； (k) 批准所得税免税期； (l) 接收和受理从有权免除关税的工业园区企业向同一工业园区内的另一企业转移建筑材料、资本货物、零部件和机动车辆的请求； (m) 对公司组织大纲、公司章程及其修正案等文件的认证； (n) 向工业园区内的员工发放税务识别号，并向外籍员工传达有关所得税免税期的决定； (o) 为工业园区企业办理增值税登记、增值税退税、发放许可证以及提供与实施凭证和其他出口奖励有关的服务； (p) 提供纳税申报、纳税、退税、税务稽查等税务服务； (q) 办理与雇主和员工有关的登记； (r) 签发原产地证书和其他必要的支持性文件，以从特殊市场机会中获益； (s) 批准环境影响评价研究并颁发证书； (t) 必要时，颁发资格证书和销售产品所需的其他证书； (u) 提供与园区相关的银行、保险、航运、物流和其他服务； (v) 向工业园区居民颁发居住证； (w) 收取雇主和员工向私人机构退休基金的供款； (x) 跟进并支持与工作相关的工人的安全和健康； (y) 处理投诉和解决争端，或为有关机关解决争端创造有利条件，特别是采用替代性争端解决方法。 2) 所有需要为工业园区最终用户提供服务的相关服务机构有义务提供服务，可亲自提供一站式服务或指定EIC或其他适当机构作为其代表在园区内提供此类服务。 3) 4) 负责在园区内提供一站式服务的政府机构，应根据工业园区的性质，制定框架结构和详细的操作程序。 5) 有关政府机关应在EIC的协调下，就一站式服务的整合和有效性达成协议。

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序号	激励措施综述	参考文献	工业园区指令	参考文本
1	a) 签发投资许可证； b) 签发营业执照； c) 商业登记证； d) 签发工作许可证； e) 注册号或商号； f) 技术转让协议； g) 组织大纲、章程公证； h) 免除关税； i) 签发税务识别号 (TIN)； j) 工业园区通关； k) 银行服务。 埃塞俄比亚投资委员会提供上述 (a) 至 (i) 项的所有服务，但同时工业园区也将受益于园区内的清关、银行业务和其他基本服务。	《投资公告》第24条 《工业园法案》第15条 《工业园区指令》第23条和第24条	<u>工业园区指令</u> 23) <u>协调工业园区一站式服务点服务</u> 1) 根据工业园区公告第27条第 (2) 款和工业园区法案第4条第 (3) 款，EIC 负责协调和实施有关政府机构提供的工业园区一站式服务点服务，主要包括： a) 确保本机构及有关政府机关或其他机构及时派遣工作人员，保证机构/工作人员的正常出勤，以及机构/工作人员之间的协调关系； g) 以电子方式提供一站式服务 24) <u>有关政府机关配备一站式服务点服务人员</u> 1) 应在工业园区内进驻或者提供一站式服务的有关机关和其他机构，应当及时配备足够数量、资质合格的工作人员。 2) 有关政府机关依照本条第 (1) 款规定委托其他有关政府提供一站式服务的，该政府机关应当保证该代表及时指派足够数量、资质合格的工作人员。	第六节 <u>一站式服务点服务</u>

附录2 埃塞综合农业产业园区建设情况

埃塞已规划建设伊戈勒姆（Yirgalem）园区、巴尔布拉（Bulbula）园区、布额（Bure）园区、贝克（Baeker）园区4个综合农业产业园区，其中，前三个园区计划于2021年建成。伊戈勒姆地处南方州，靠近咖啡产地，具有丰富的水果资源，适宜咖啡和水果加工。巴尔布拉园区位于奥罗米亚州，靠近丰富牛源以及多家育肥场和屠宰场，具有畜牧业的发展潜力。布额园区位于阿姆哈拉州，适宜农作物加工类投资。贝克园区位于提格雷州，适宜芝麻等经济作物加工投资，受战乱影响尚未完工。

入驻农业园区的外资投资可享受各类税收优惠减免措施，具体内容可参考附录1。四个农业园区皆设计有开放生产区域、受控环境种植、精准农业、知识中心和研究设施、农村中心、农业基础设施、收集中心、初级加工中心、社会基础设施和农业营销基础设施等。除此之外，每个园区都配备现代化的基础设施，一般基础设施包括道路、电力、供水、通信、排水、污水处理等，专业基础设施包括冷藏单元、检疫设施、质量控制实验室、质量认证中心、原材料储存和中央处理中心等。

另外，每个农业园区都由多个农村转型中心连接而成的网络提供服务，该网络连接了投资者与生产者，便于园区企业和农户相互联系。农村转型中心是在农业园区100千米范围内的综合服务设施，收集、分类、储存各类农业投入和原材料，并运送到农业园区进行加工。

园区	伊戈勒姆（Yirgalem）	巴尔布拉（Bulbula）	布额（Bure）	贝克（Baeker）
位置	南方州东部伊戈勒姆（Yirgalem）	奥罗米亚州中东部巴尔布拉（Bulbula）镇	阿姆哈拉州西南部布额（Bure）镇	提格雷州西部贝克（Baeker）镇
占地面积	一期为214.86公顷	一期为263公顷	一期260.35公顷	一期为258.62公顷
地区优势 和投资潜力	谷物、咖啡、水果、蔬菜、乳制品、肉类以及其他动物产品	靠近两个运营中的甘蔗种植园 靠近多家育肥厂、奶牛场、屠宰场 靠近Koka大坝、裂谷湖（Zeway、Langano），具有渔业发展潜力 小麦、大麦、扁豆、蚕豆、番茄、马铃薯、水果和蔬菜、乳制品、鱼、家禽、蜂蜜和肉类	玉米、芝麻、马铃薯、活体动物（牛、绵羊、山羊） 乳制品、肉类、蜂蜜	高粱、芝麻、水果、蔬菜、乳制品、肉类和其他动物产品



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Part I

Research on China-Ethiopia Beef Cattle Industry Value Chain Cooperation



The Growth and Transformation Plan II 2020 sets ambitious targets for the livestock sector: Ethiopia plans to become the first livestock exporter in Africa by 2025, and significantly increase the competitiveness of its livestock products worldwide. In particular, beef cattle industry is one of the preferential developmental industries.

To date, the cooperation between Ethiopia and China in the livestock sector is relatively limited except leather production. There is no beef trade between the two countries, but there are still opportunities to expand cooperation in animal husbandry. Ethiopia has the fifth largest cattle inventory in the world and has great development potential; China has rich experience in the development of animal husbandry industrialization, and will remain the largest beef import market in the world.

According to the previous research of ATA, the added value of beef export in Ethiopia is very low, and is distributed across the value chain. The commercial operation is limited, the export volume is small, and exports mainly go to the Middle East. Ethiopia hopes to adopt a more strategic and comprehensive approach to solve the problem of value chain rupture, and ultimately serve the huge and growing East/Southeast Asian market in the future. Through the introduction of experienced private sector participation in beef production, especially those cooperating with smallholder farmers in an inclusive model, and the introduction of improved inspection and quarantine standards, and key intervention measures to improve the level of industry integration, we hope to support Ethiopia's achievements in animal husbandry development. China is one of the countries with support measure packages.

1 Literature review of Ethiopia's beef cattle industry value chain

The livestock sector occupies an important place in the Ethiopian economy, contributing 20%^① of total GDP and 50% of the agricultural GDP and it is estimated to contribute 16%-19% of foreign exchange earnings to Ethiopia. The sector not only hold non-monetary social value, but are the most attractive asset for storing and accumulating wealth.

In Ethiopia, about 45% of the total livestock is cattle. Ethiopia has the largest cattle herd in Africa and the 5th largest in the world, nearly 60 million heads, 5% of global population in 2016. Despite its huge livestock population, Ethiopia only exported 28,000 tonnes in 2016, which contributes 0.3% of global beef exports and ranks only 33rd in the world.

To increase market supply, the Livestock Master Plan (LMP) sets the target to increase red meat production by 52% by 2020. However, the current production is inadequate to meet the target and innovative interventions must be developed and introduced to improve productivity and thereby increase supply of beef through commercialization, including attracting the FDI into the sector.

This chapter gives a quick review on the performance status, government's targets and main constrains in Ethiopia's beef cattle industry value chain development based on related documents and statistical data provided by the ATA.

1.1 Ethiopia's beef cattle industry is in the primary development stage

1.1.1 Cattle production systems

Cattle are mainly raised by the farmer households freely in Ethiopia. There are two main livestock production systems prevalent in Ethiopia: ① Highland crop-livestock mixed production system, with about 35-40 million cattle, and 2-5 cattle herd size per household. This system covers about 40% of the countries land area and located at an altitude above 1,500 meter above sea level. Cattle in the highlands is mainly produced for draught power (40%-50%) with dairy cows making up 25%. After 4 to 5 years of providing draught service, bulls are then sold for beef. The large number of animals in the highland areas of Ethiopia is livestock, using crop residues and natural pasture as feed, less disease prevalence, and relatively adequate water supply. ② Lowland livestock production system, with about 10-20 million cattle, and 10-15 cattle herd size per household. This system covers about 60% of the total land and located in an altitude below 1,500 meter above sea level. About 70% of cows are dairy breeds, and bulls are often sold to highland areas used for draught purposes.

① Data in this chapter mainly comes from relevant internal documents provided by ATA. See references for details.

1.1.2 Breeds and breeding

There are about 27 indigenous and a few exotic cattle breeds (e.g., Friesian, Holstein, Jersey and Simmental) in Ethiopia. The Ethiopian indigenous Boran cattle breed is comparatively superior in terms of growth, reproduction, and carcass traits than other indigenous cattle breeds. Boran breed produces high quality beef and has high feed conversion efficiency.

Productivity of Ethiopia's indigenous cattle breeds varies depending on breed type and management in general. However, productivity of these cattle falls far behind improved breeds in similar agro-climatic conditions in other countries. Improved genetics inputs, such as improved bulls and heifers supply, and improved genetic material (semen) and liquid nitrogen supply are key towards enhancing cattle productivity and quality of meat. At present, the supply and availability of these inputs to rural producers is inadequate. Besides, the success rate of breeding (natural and AI) and management practice is very low. The beef cattle breed improvement centers and breeding farms of the country are established to conduct research on breed improvement and distribute improved breeds to farmers and breeders. However, breeders pay limited attention to this direction.

1.1.3 Feeds and fattening

The cost of animal feed is constantly on the rise, almost doubling in the past 7 years. Seasonal dynamics of forage availability due to seasonality of rainfalls limited land allocation for improved forage production due to competition with food crops and lack of awareness, and overgrazing and poor management of the natural pasture in the highlands and rangelands in the lowland pastoral and agro pastoral areas, shortage and high price of agro-industrial by-products (e.g., flour mill and oil extraction by-products) and compound feeds from agro-processing industries lead to uneven animal feeding and fattening across regions, and thus restraining production capacity development. Moreover, the lack of modern feeding technology and management practices in livestock sector is also an important factor that affect feeding.

In Ethiopia, cattle fattening is conducted by smallholder farmers (traditional), small and large-scale feedlots where the latter is mostly export-oriented. Feedlots play intermediary role by smoothing out market fluctuations in both volume of cattle and quality of red meat. This model is growing rapidly due to growing opportunities presented both by the export demand for live animals and by the domestic market for red meat. Feedlots buy cattle at a low price in primary markets and then add value to it through supplementary feeding, in order to sell animals in markets that are more profitable. Feedlots purchase animals through market agents or from small- and medium-scale traders (cattle vendors) and, occasionally, from cooperatives. Feedlots usually buy cattle that weight less than 200 kg and all bulls meant for export stay in the feedlot until they meet at least the minimum weight standard of 300 kg. Feedlots often use rented vehicles to transport the animals. Constrained by their financial capacity, their operations are limited to a small geographic area; lack of access to production inputs (e.g., feed, water, land) and to credit are

hindering the expansion of fattening facilities.

Currently, less than 1M slaughtered cattle are actually from feedlot accounting for 1.7%. Ethiopia's livestock master plan plans to funnel more than six million cattle from feedlots by 2030. Achieving this goal will require a massive increase in the fattened herd size. The number of small and medium specialized cattle feedlots needs to be increased from 30,000 head in 2014 to 577,000 head in 2021.

1.1.4 Vaccines and veterinary drugs

The Livestock Resource Sector of the Federal Ministry of Agriculture is responsible for quarantine services and quality control of vaccines and veterinary drugs, and also responsible for research and disease monitoring through federal research institutions and regional veterinary laboratories. Although the government budget is insufficient to meet the annual demand for domestic and international drug purchases, government agencies are still the main provider of animal health product distribution.

The National Veterinary Institute (NVI) in Bishoftu produces 23 kinds of different vaccines against various bacterial and viral diseases. However, its current production capacity does not meet the actual demand of such vaccines. At present, the Federal government no longer imports veterinary drugs by itself. Instead, it purchases veterinary drugs, equipment and chemicals (imported and locally manufactured) in bulk from private companies through tendering, and distributes them to various regional states. Private importers are import to distribute and supply veterinary drugs, equipment and chemicals to small holder farmers under the supervision of the government.

The lack of large-scale and systematic animal immunization is one of the major impediments in expanding foreign markets. There are vaccination programs at Kebele level (lowest administration unit in Ethiopia) for seasonal diseases in Ethiopia, and the programs mainly target at vaccinating exporting herds. Diseases outbreaks cannot be rooted out, and the two-year disease free OIE export standards cannot be met.

1.1.5 Marketing and trade

Ethiopia's live animal market functions at three levels: ① primary markets are those at the village level, with generally less than 500 head sold per week. ② Secondary markets have a turnover of 500-1,000 head of animals per week. These markets are dominated by intermediaries (traders and agents, or "cattle vendors") but also serve local butchers. ③ Terminal markets are those located in large urban centers. These are dominated by medium- and large-scale trading companies. The three levels markets are poorly organized and scattered, with various types of buyers, sellers and intermediaries participating in them. Access to infrastructure between the markets is poor. Livestock supplied to the market in most cases are trekked.

In most livestock markets, there is no objective standard for selling and buying animals except

visual observation. The current system of sourcing animals from smallholder producers through multiple brokers makes it difficult to supply high quality meat at a competitive price to export markets.

1.1.6 Slaughtering and processing

The meat processing industry is on the rise in Ethiopia. City slaughterhouses and export abattoirs, butchers and restaurants/hotels play a major role (Figure 1-1). Commercial slaughtering facilities are the main actors in the processing link. They source live animals from traders or directly through their market agents. Most abattoirs are established for export purposes but there are local slaughterhouses that provide service to butchers and retailers for domestic consumption.

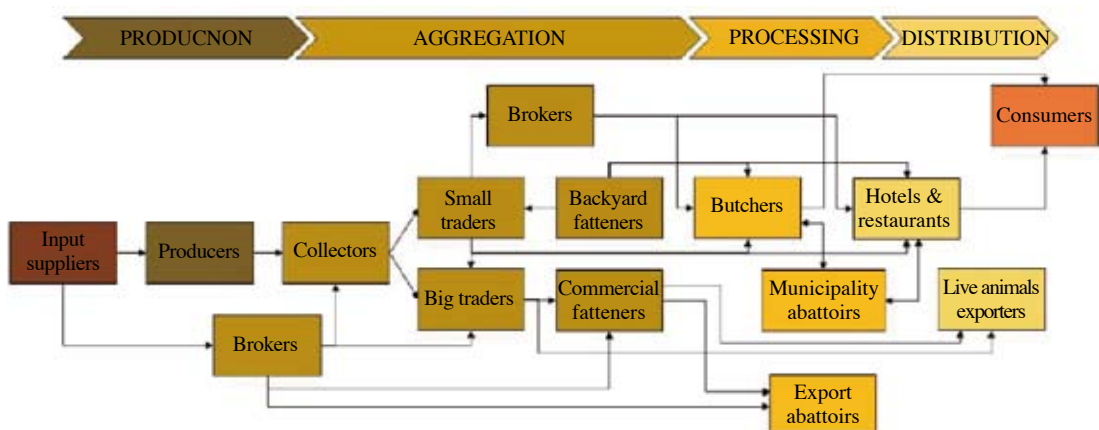


Figure 1-1 Livestock market channel in Ethiopia

Virtually all of Ethiopia's red meat exports pass through formal channels due to the strict regulation of importing countries. Around half of all cattle are slaughtered outside of abattoirs since live exports and backyard slaughter emerged. The formal export of live animals and meat has promoted the establishment of slaughter and fattening facilities at various locations. Such locations are affected by feed supply, air transportation, proximity to markets, and the livestock walking distance to slaughterhouses. In most cases, the slaughtering is done when slaughterhouses receive and order from their customers. This order-based slaughtering does not allow the abattoirs to operate at full capacity and estimated operating abattoirs are at 34% capacity on average. Most slaughterhouses and abattoirs lack modern technologies and standardized facilities, and lack the ability to produce semi processed or deep processed meat products. The product specifications and varieties are limited, and the meat quality is hardly guaranteed.

1.1.7 Demand and markets

Ethiopia's domestic market for beef is growing. The average per capita consumption of beef remained approximately 5 kilogram per year from 1993 to 2011, but as population grows, total beef consumption in Ethiopia grew at an annual average rate of 3.2%. Beef price has change about

50% higher in 2014 than in 2005. The price per kilogram for superior, high grade, moderate, fair and low-quality beef in Addis Abbaba in 2017 was USD 9.8, USD 8.2, USD 6.5 and USD 4.4 respectively. Ethiopia's domestic red meat consumption is reported to be low due to high prices, which are unaffordable for low-income households; in addition, long fasting periods of the Ethiopian Orthodox Church (over 200 days per year) contributes to the low consumption of meat. As countries become wealthier, people will consume more meat. This trend will apply to Ethiopia.

Ethiopia's share in the global beef exports was barely 1%, which is mainly caused by the following reasons: ① low offtake rates (6% in 2013; China was 35%). ② large numbers of animals sold live, bypassing abattoirs and through illegal cross border trade. ③ most pastoralists only sell in time of need, and prefer to build herd size. ④ lack of certifications and international standards. ⑤ export market is not highly competitive in international markets due to factors such as disease, quality and cost. ⑥ low productivity which is due to low genetic potential indigenous cattle for functional traits, shortage of access for quality and affordable feeds; prevalence of disease, lack of awareness improved management etc. ⑦ Lack of policy support to incentivize producers (e.g., land use) and other actors involved in beef value chain.

Live animal exports from Ethiopia are subject to periodic interruptions from bans imposed by importing countries due to disease outbreaks. Top export markets of live animal are Sudan, Somalia, Egypt, Djibouti, Saudi Arabia, Yemen and the United Arab Emirates. In regard to red meat, the Middle East dominates Ethiopia's export markets.

1.2 Major bottlenecks and SWOT analysis

In terms of production quality, quantity and price competitiveness, main bottlenecks in beef cattle industry value chain are as follows: ① Relevant policy support, supervision and law enforcement are weak. ② Due to high cost and shortage of high-quality feed, the investment on high-quality feed is insufficient. ③ Lack of effective epidemic disease prevention made animal health difficult to be guaranteed. ④ Lack of experience market-oriented livestock production. ⑤ Due to the imperfect development of the market, the intermediaries are highly involved. ⑥ The downstream market links are weak. ⑦ Limited transportation infrastructure leads to poor meat quality. ⑧ An oversupply of intermediaries left farmers with little value. The government hopes that once the key value chain constraints are solved, Ethiopia will have the opportunity to become an important participant in three core markets: the Middle East market as the top priority; East Asia and Southeast Asia as the mid-term; fast-growing African market as the long-term aim.

The overview of the SWOT analysis for the cattle value chain is as follows (Table 1-1).

Table 1-1 Beef value chain SWOT analysis

STRENGTHS

- The livestock sector has economic relevance and potential for employment creation;
- There is an existing culture of cattle and small ruminants rearing, as well as of consumption of red meat;
- Government has an ambitious Master Plan for the livestock sector and a clear vision for transforming the agricultural sector through the creation of Integrated Agro-Industrial Parks;
- National & Regional Centers for Animal Health Diagnosis have been established;
- National and Regional livestock research institutions and centers have been established to develop knowledge and technologies relevant to improve livestock productivity.
- National and regional livestock sector extension system established and operational
- National veterinary institution able to produce vaccines for various live animals have been established;
- A number of Universities and Technical and Vocational Colleges established and producing agricultural graduates
- There are existing institutions and projects/development partners supporting the livestock sector, e.g., quarantine stations, feedlots, slaughterhouses/abattoirs and meat processing companies have been established.

WEAKNESSES

- Low support for livestock sector from the government
- In some areas, available land is decreasing due to demographic pressure, expansion of cultivations, land degradation and absence of land use policy;
- Productivity of indigenous livestock breeds is low and there is not a well-established and sustainable breeding program (including a national database and a functioning recording system);
- The quality and quantity of forage and manufactured feed is insufficient and access is limited;
- There is limited research on livestock development in general (e.g. breeding, feeding, etc.);
- Animals are not well managed and there is limited knowledge and skill of modern animal husbandry practices. In addition, watering of animals is predominantly from rain-based sources (streams, lakes, etc.);
- Vaccination of animals is not systematic and there is lack of periodic follow-ups and check-ups (no animal quarantine). Also, there is high incidence of animal diseases of economic importance;
- Public animal health services and extension services are weak and their offer is not proportionate to the demand and know-how of producers;
- Weak involvement of the private sector in the provision of clinical services (mostly engaged only in the sale of veterinary drugs and equipment);
- The informal channel is dominant on domestic and export markets. Most producers are not well connected to processors through formal business arrangements, and there is a lack of incentives toward market formalization;
- In many areas, production is not commercially-oriented and smallholder producers sell animals only to face immediate cash needs or to dispose of unproductive animals. Hence, there is limited supply of quality animals for processing;
- There is lack of working and investment capital and limited access to credit and financial services at all the nodes of the value chain;
- On the domestic market, the level of per capita consumption of red meat is very low.

OPPORTUNITIES

- The sustained growth and the positive economic outlook of Ethiopia are favorable to investments in the livestock sector, among others;
- There is a considerable livestock population (both cattle and swine) and both the highland and lowland areas have good cattle and sheep production potential;
- There are diverse and adaptive indigenous cattle and shoat breeds that can be used for genetic improvement;
- There is availability of relatively cheap labor, mostly unskilled;

(Continued)

- Population growth and the increasing urbanization (emerging middle-class segment of consumers in urban centers) will favor consumption of more red meat;
- There is a high demand for Boran cattle breed on the export market.

THREATS

- There are unreliable climatic conditions due to climate change;
- There is a mismatch between supply and demand of live animals due to seasonal, spatial and cultural factors;
- Quality requirements and food safety standards in importing countries often result in rejection and ban of live animals (and meat products);
- There is an environmental risk posed by an increased number of low producing livestock.

1.3 Government's development goals and actions

1.3.1 Livestock development strategies

Ethiopia launched the Agricultural Growth and Transformation Plan (GTP), taking a series of intervention measures to promote the transformation of the agricultural sector in the country. The GTP-II objectives for livestock include reduced poverty; better food security; contribution to national income growth; increased exports and foreign exchange earnings; and contribution to climate change mitigation and adaptation. Vision for red meat is that the projected domestic consumption requirements for red meat that arise due to rapidly growing population, increasing urbanization, and rising incomes will be met; and live animal and meat exports will be increased to generate foreign exchange earnings.

The Ethiopia livestock master plan sets out investment interventions, e.g., better genetics, feed and health services, which, together with complementary policy support, could help meet the GTP II targets by improving productivity and total production in the key livestock value chains.

There are clear deliverable objectives for livestock sector transformation in the following four area: I. **Livestock genetic improvement:** ① Establishing a national system and institutional arrangement to lead and coordinate livestock genetic evaluation and improvement as well as input delivery schemes; ② Enhancing role of private sector in livestock genetic improvement and input delivery. II. **Livestock feeds and feeding:** ① Creating enabling environment for sustainable production and supply of adequate, quality and affordable feeds and fodder, and for rationalizing free grazing; ② Improving feed and water security in pastoral and agropastoral areas. III. **Animal health:** ① Reducing young and adult stock mortality in different production systems; ② Strengthening and supporting establishment of innovative animal health field services and diagnostic capacity and quality management system of national & regional veterinary laboratories to enhance disease prevention and control. IV. **Livestock market:** ① Strengthening the enabling environment for efficient and effective livestock marketing system; ② Strengthening and developing livestock and products market infrastructure and market link to enhance domestic and export markets.

1.3.2 Establishment of Agro-Industrial Parks

The development of Integrated Agro-Industrial Parks has been prioritized in Ethiopia's national development strategy. An Integrated Agro-Industrial Park is a geographic cluster of independent firms, clustering essential infrastructure, utilities and services required for business operations and growth. The Parks also enable links with global agricultural value chains. Four Agro-Industrial Growth corridors have been selected for piloting the establishment of four integrated Agro-Industrial parks (see the attachment 2).

Oromia region is the largest in terms of cattle population followed by Amhara region. FAO designed a business plan for Central-Eastern Oromia in 2017. The vision was to promote rapid and sustainable growth of the live animals and red meat value chain in the Agro-Commodities procurement Zone of the pilot Integrated Agro-Industrial Park in Central-Eastern Oromia through enhancement of production & productivity of commercially-oriented small holders and feedlots to increase the availability of quality cattle, and strengthening of commercialization through formalization of the livestock market channels and, ultimately, to distribute safe red meat to both domestic and export consumers by 2020.

1.3.3 Related international development cooperation programs

The Ethiopian government actively attracts international development cooperation programs to support its development. Over the 2018-2024 period, at least 197.2 million US dollars is expected to be invested across the livestock sector in development interventions by international development programs. Eighty nine percent of the amount comes from the World Bank Livestock & Fisheries Sector Development Project (LFSDP). The program will focus on three components: ① linking more productive farmers to markets; ② strengthening national institutions and programs; ③ project coordination, monitoring and evaluation, and knowledge management. There are 4 livestock commodities prioritized for this program. These are Red meat, Dairy, Poultry and Fisheries and Aquaculture. The program covers 58 woredas across six regional states (Oromia, Amhara, SNNPR, Tigray, Benishangul Gumuz and Gambella). More than 1.2 million households will benefit from this program.

2 China's experience of beef cattle industry development

2.1 Industry development and change

China's beef cattle industry experienced several development stages: draft cattle → dual-purpose cattle for draft and meat → dual-purpose cattle for draft and meat or meat and milk → beef cattle. In 2019, China's total cattle (including cattle for draft, meat and milk) inventory was 91,380,000 head, ranking the third place in the world. China's beef cattle industry has made great progress, growing from a traditional livestock industry with an output value of less than 1 billion US dollars to an innovative industry with a potential value of hundreds of billions of US dollars.

2.1.1 Draft cattle stage in China before 1980

Before the Reform and Opening Up, China had no independent beef cattle industry. As early as 4,000 years ago during the Xia and Shang dynasties, Wild oxen were successfully domesticated by ancient Chinese into domestic cattle, commonly known as Yellow Cattle. In history, Chinese cattle were mainly used as draft and sacrifice, and only aged and disabled cattle were used for food. After the founding of New China in 1949, China had a cattle stock of 48.10 million in 1950, mainly draft cattle, dairy cattle, yaks and buffaloes. This number increased to 70.72 million in 1978. At this stage, the level of agricultural mechanization is low. Traditional farming labor and farmers' basic production and living activities mainly relied on livestock labor, and domestic cattle were mainly draft cattle.

2.1.2 Dual-purpose for draft and meat from 1980 to 2000

At this stage, with the popularization of agricultural machinery and the growth of the beef consumption market, the traditional draft cattle or plow cattle began to fade into history. To improve meat performance, China started to import frozen semen and embryos of pure breed beef cattle from developed countries such as United States, Canada, France and Australia. The most widely used foreign beef breeds were Simmental, Charolais, Limousine and a few others. Although the performance of the modified hybrid beef was significantly improved, the number of draft cattle dominated until 2000 in China (Figure 2-1).

At this stage, international trade of live cattle and beef emerged but the volumes were small. In terms of exports, small quantities of live cattle and beef were exported. In 2000, live cattle exports were 64,770 heads, with an export value of 37.96 million US dollars; beef exports were 20,000 tons, with an export value of 23.36 million US dollars. The main export markets were the Middle East, Russia and other countries. In terms of import, the number of imported live cattle and beef were very small, and the imported live cattle were mainly bulls. In 2000, beef import was 5,600 tons, and the import value was 6.27 million US dollars.

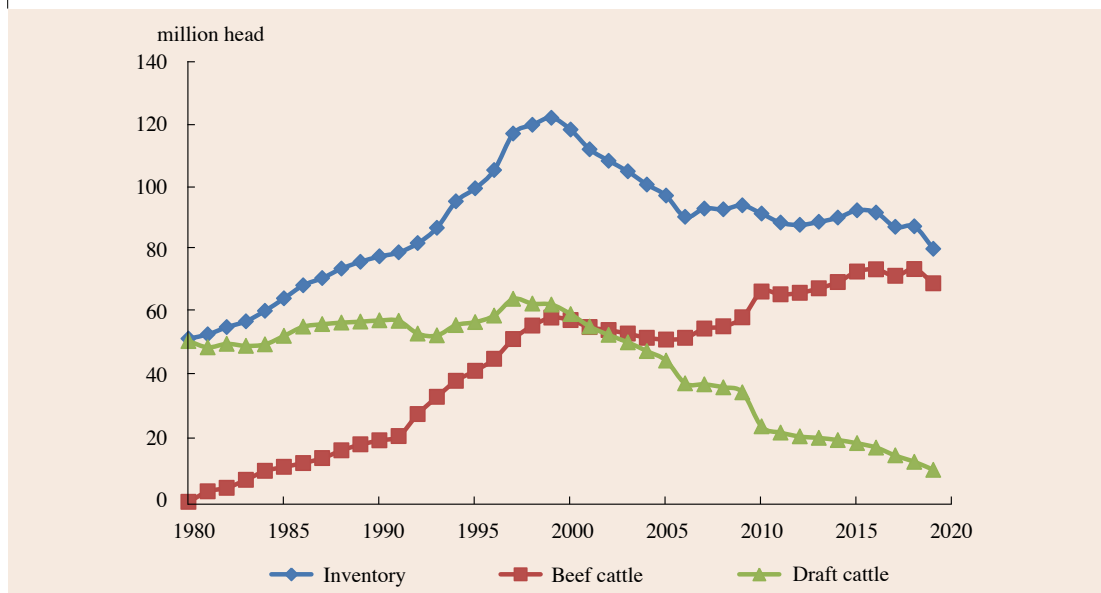


Figure 2-1 Changes of beef cattle and draft cattle inventory in China 1980-2019

Source: *Livestock and Veterinary Statistics of China 2000-2019*, edited by Livestock and Veterinary Bureau of the Ministry of Agriculture and Rural Affairs of China National General Station of Livestock, China Agricultural Press, Beijing.

2.1.3 Dual-purpose for draft and meat or meat and milk, and beef only from 2000 onward

Driven by the strong demand for beef market, China's beef cattle industry has undergone a rapid transformation since 2000 to a direction where meat is used as a main purpose. Beef cattle has become a dominating industry of animal husbandry. As shown in Figure 3, the year 2000 was the inflection point of the rapid transformation from draft cattle to beef cattle in China. From this year onward, the total cattle inventory in China began to decline, but the number of beef cattle increased rapidly, while that of draft cattle decreased rapidly. Compared with 2000 (58.37 million in inventory; 39.65 million slaughtered), these numbers in 2019 reached 69.98 million and 45.34 million, respectively, up 20% and 14.3%. By the year 2019, the proportion of beef cattle has reached 86.5% of the total 80.94 million cattle inventory, among which meat cattle accounted for 86.5% while draft cattle only 13.5% of the total number. With the acceleration of beef cattle crossbreeding, it is predicted that draft cattle will basically disappear in the next 5 to 8 years in China.

At this stage, the beef production increased from 5.31 million tons in 2000 to 6.67 million tons in 2019, an increase of 30.1%. However, the consumption demand of Chinese consumers for beef increased even faster. The production capacity of Chinese beef industry could no longer meet the domestic demand, and the import increased rapidly. See Chapter 3 for the analysis of consumption and import.

2.2 Industry characteristics

2.2.1 Major beef cattle production areas

China's beef cattle production areas are located in four major regions, namely the central plains,

northeast, northwest and southwest. There are 51 counties in 4 provinces including Shandong, Henan, Hebei and Anhui in the central region, which is traditional agricultural region with abundant grains and crop residue resources and an important base for feedlot production in China. Northeast region includes 60 counties in 5 provinces including Jilin, Heilongjiang, Liaoning, Inner Mongolia and Hebei, which is pastoral area, agricultural area and semi-agricultural area, and an important base for cow-calf, stockers and feedlot production. Northwest region includes 29 counties in Xinjiang, Gansu, Shaanxi and Ningxia provinces, which is rich in grassland and crop resources and an important base for cow-calf, stockers and feedlot production. The southwest region includes 67 counties and cities in Sichuan, Chongqing, Yunnan, Guizhou and Guangxi provinces, which is also important base for cow-calf, stockers and feedlot production with abundant grass hills, grass slopes and crop residues.

2.2.2 Rich breed resources of beef cattle

The main beef cattle breeds in China come from local yellow cattle breeds, among which the most representative ones are Qinchuan cattle, Nanyang cattle, Jinnan cattle, Luxi cattle, Yanbian cattle, Mongolian cattle, Sanhe cattle, Xinjiang brown cattle and Grassland Red cattle.

With thousands of years' domestication and selection, Chinese yellow cattle are more suitable for draft than meat. Therefore, drawing on the experience of foreign countries with developed beef cattle industry, China began to introduce foreign beef breeds in the 1980s to produce new beef cattle breeds at home. Through unremitting efforts, China is able to produce new breeds such as Xianan cattle, Liaoyubai cattle, Yanhuang cattle, Yunling cattle and Shuxuanhua cattle. Since 2016, China has imported more than 200,000 Angus, Hereford and Simmental breeding cows from Australia, New Zealand, Uruguay, Chile and other countries that are allowed for live cattle import for continuous breed improvement. At present, there are 77 beef breeds and yellow cattle breeds in China. In addition, there are 11 yak breeds, 26 buffalo breeds and 1 *Bos frontalis* breed.

With the further progress of *National Beef Cattle Genetic Improvement Plan (2011-2025)*, the construction of China's core breeding farms of beef cattle has become more standardized. The national core breeding farms have now grown to 38, and the production performance of the herd has been significantly improved. Some well-equipped breeding farms and fattening enterprises began to explore superior beef cattle breeding models suitable for local ecological and fattening conditions.

The main technique of beef cattle breeding in China is regular performance tests. Molecular assisted breeding technology has gradually penetrated into the breeding process, which is more closely combined with the selection of traditional apparent traits, making higher breeding efficiency. The whole genome selective molecular breeding technology system was promoted to the genetic evaluation of seed stock in core breeding farms, which played an important role in improving production efficiency and international competitiveness of the seed industry. In terms

of mining and utilization of local beef cattle genetic resources, crossbreed improvement will be continuously carried out in an orderly manner to improve the performance of meat production.

2.2.3 Trending towards feeding at scale

(1) **Traditional feeding in agricultural areas.** The traditional beef cattle feeding in agricultural areas mainly relies on the draft cattle and cattle culled from dairy sector. These areas feature abundant straw resources and relatively low cost due to feed price. However, this feeding model always has small scale, poor feeding technology and growth rate, which makes lower marketing rate, dressing percentage and meat quality. With the low beef product quality and quantity, traditional beef cattle production model is far from meeting demand of Chinese beef consumers. As the mechanization of agricultural production is continuously improved, the culled cattle and draft cattle feeding will gradually withdraw from the historical stage.

(2) **Grazing feeding.** Beef cattle in pastoral areas is generally raised using abundant natural grass resources, at the same time, the manure from cattle can be used as organic fertilizer for grass growth, so as to form a relatively orderly circular ecological chain. However, overgrazing and predatory production have led to grassland and environmental degradation in the recent years. Therefore, it is difficult for the traditional grazing model in pastoral areas to meet people's demand for beef products.

(3) **Intensive large-scale fattening.** After more than 30 years of practice and exploration, China's beef cattle feeding model has transformed from being mainly operated by small farming households to feeding at a moderate scale. As shown in Table 2-1, in 2019, the proportion of cattle farms with 1-9 slaughter head dropped from 98.5% in 1980 to 50.9%. About 21.7% of cattle farms produced 10-49 slaughter head annually, 9.8% produced 50-99 head, and 17.6% produced more than 100 slaughter head annually. The fattened cattle produced in proper scale feeding model have the advantages of fast finishing speed, high production efficiency and superior beef quality. "Breeding in pastoral areas and fattening in agricultural areas", "breeding in the North and fattening in the South" and "decentralized cow fattening and fattening cattle concentrated feeding" are becoming the mainstream breeding methods of beef cattle industry in China.

Table 2-1 Changes of China's beef cattle feeding scale

Item	1980	2019
Annual market 1-9 head	98.5	50.9
Annual market 10-49 head	1.3	21.7
Annual market 50-99 head	0.1	9.8
Annual market 100-499 head	0	10.0
Annual market 500-999 head	0	3.3
Annual market >1,000 head	0	4.3

Source: Livestock and Veterinary Statistics of China 2000-2019.

2.2.4 Localization of feed production

The feed needed for beef cattle feeding in China is completely produced and supplied domestically, which benefits from China's complete and mature feed industry system. In 2011, China's commercialized feed output reached 200 million tons, surpassing the United States and ranking the first in the world. Since then, China has led the development of global feed industry for nine consecutive years. In 2020, China's total output of formulated feed reached 252.76 million tons, and the output value of feed products reached 129.1 billion US dollars.

(1) The feed ingredients produced by farmers are mixed with concentrated feed. Beef cattle farmers in most agricultural and pastoral areas usually have both roughage supply such as crop residues and silage, and energy feed supply of concentrate supplement supply such as corn, wheat bran, rice bran, etc. Added with the protein concentrated feed purchased from the nearby commercial feed mill, then the feed with nutritional value basically meeting the nutritional needs of beef cattle is ready.

(2) Miniaturization and low-price feed processing equipment is widely used. With the increase of labor cost in China's beef cattle breeding industry, it is common to use machines to assist feed processing and feeding in the process of beef cattle breeding. In the general farm scale beef cattle farms, the miniaturized and low-cost processing equipment is most widely used in the crushing, mixing and full-mixed feed production of concentrate feed raw materials.

(3) Feed technology helps beef cattle feeding industry. With the rise of feed prices and the implementation of the national policies on banning animal feed, a new technological revolution was ushered in in the field of beef cattle production. Feed science and technology aiming at "reduction and substitution" was being widely developed. "Reduction" means reducing the consumption of high-cost raw materials such as corn and soybean meal and switching to wheat, cottonseed meal, rapeseed meal, peanut meal and other local by-product feed resources. "Substitution" refers to the use of a variety of products to enhance animal disease resistance and promote growth and development to replace the use of feed antibiotics, so as to ensure the health of consumers and the safety of the table. These alternative products include enzyme preparations, plant extracts, immune enhancers, live bacteria preparations, organic acids, etc.

2.2.5 Basically complete disease prevention and control

(1) The establishment of the national animal epidemic prevention system. The prevention and control of animal diseases in China adopts the strategies that classification guidance depending on disease type, region, livestock type, and differentiated management, emphasis on key points and overall planning and promotion. In May 2012, China formulated the *National Plan for Medium- and Long-term Prevention and Control of Animal Epidemics and Diseases (2012 to 2020)*, which clearly lists 16 priority domestic animal epidemics and diseases to be prevented and controlled and 13 key foreign animal diseases to be prevented. Incidence rate of animal

diseases such as foot and mouth disease and other 16 priority domestic animal diseases met the planned assessment standard by 2020. The incidence rate of cattle dropped to below 4%, and animal morbidity, mortality and public health risks were significantly reduced. The prevention and control of animal diseases in China is transitioning from effective control to gradual purification and elimination, and vaccine and diagnostic technologies are important technical supports for the prevention and control of beef cattle diseases.

(2) The establishment of animal epidemic prevention system at the county and township level. Animal epidemic prevention supervision institutions are set up in all counties in China, and animal health and epidemic prevention stations are set up in towns and towns. A base-level animal epidemic prevention system jointly managed by counties and townships is formed, and the specific work of animal epidemic prevention and quarantine at the base level is undertaken. In the beef cattle breeding chain, the animal epidemic prevention supervision institution at the county level is responsible for distributing free vaccine allocated by the state, and training the first-line epidemic prevention personnel at the township level. The base-level epidemic prevention personnel in the township are responsible for the vaccination and injection of beef cattle, the establishment of immunity information accounts and information reporting. All vaccines used in beef cattle in China against diseases including foot and mouth disease, brucellosis, pasteurella, bovine infectious pleuropneumonia, bovine infectious rhinotracheitis, bovine viral diarrhea, etc., are produced in China.

2.2.6 Preliminary maturity of slaughtering and processing systems

The annual slaughtering capacity of beef cattle in China is about 43 million head, mainly slaughtered in small workshops, and the products are mainly supplied to farming product markets; there are more than 250 large-scale enterprises with annual slaughtering capacity of more than 10,000 heads, accounting for about 10% of the total annual slaughtering capacity. The products are mainly supplied to large supermarkets, catering groups, etc. The majority of beef cattle slaughtering and processing enterprises adopt the halal slaughtering model, and at the same time, they also operate mutton sheep slaughtering. Slaughtering equipment is mainly made in China, and a few equipment such as split saw, cutting tools and packaging equipment are imported from Europe and the United States.

(1) From decentralized slaughtering to centralized slaughtering. After the implementation of the policy of “decentralized operation, centralized tax payment, centralized quarantine and designated slaughtering” for pigs, which effectively guaranteed the safety and health of pork consumption, beef cattle slaughtering enterprises are also trying out the practice of slaughtering of beef cattle at designated places centrally. The Ministry of Commerce of China issued the *Guiding Opinions on Strengthening the Management of Cattle and Sheep Slaughtering* in 2004, which clearly put forward the management system requirements of beef cattle slaughtering and centralized quarantine with reference to live pigs. In Beijing, Shanghai, Shenzhen, Zhejiang, Fujian, Guangzhou and other large beef consumption cities, slaughtering at designated places and

centralized quarantine management system has been implemented to ensure the safety of beef consumption for consumers.

(2) Large scale slaughtering enterprises implemented the traceability management system for the slaughtering process. Beef cattle slaughtering enterprises with annual slaughter capacity of more than 10,000 head have basically implemented the food safety traceability system based on RFID tags and QR codes, realizing traceability management of beef cattle from live cattle slaughtering to beef cuts entering the supermarkets.

(3) Official veterinarians are responsible for the quarantine inspection of beef cattle during slaughtering. Before the cattle to be slaughtered enter the slaughtering line, the livestock owner shall provide the official quarantine certificate to the official veterinarian or animal quarantine officer. The pre-slaughter inspection shall ensure that no cattle died of diseases is allowed to enter the slaughterhouse, and the post-slaughter inspection shall check that no unqualified beef and viscera are allowed to enter the market. Slaughterhouses also require rapid detection of moisture content. If the moisture content of beef exceeds 78%, it shall be treated as water injected meat and shall not enter the market. If any infectious disease required to be reported for quarantine by the state is identified, it must be reported in time.

(4) A large number of beef cattle slaughtering enterprises as well as their quality beef brands stood out. “Kerchin”, “Qinbao”, “Hondu Beef”, “Yisai”, “Hulunbeier Meat Group”, “Qilian Pastoral”, “Oriental Wanqi” and some other enterprises and their beef brands have become the symbols of high-quality beef enterprises and beef products in China across different regions. These beef production enterprises have experienced the development of Chinese beef industry in the past decades, during which time they accumulated rich experience in production and cost control as well as a wide range of marketing channels.

2.2.7 Continuous improvement of industrial technology service system

The government has established a complete beef cattle industry technology promotion system, from China National Livestock Central Station and China Animal Disease Control Center on the national level to the livestock and veterinary management departments of provinces, cities and counties, all undertake the task of promotion and application of various technologies in the national beef cattle industry value chain among farmers and breeders.

China’s beef industry has established professional talent teams covering all links from scientific research to production. As the Ministry of Agriculture of China launched the “National Agricultural Technology System Program” in 2010, a high-level technical expert team of beef cattle industry composed of more than 400 scientific and technological personnel specializing in all links of China’s beef cattle industry chain entered the front line of the national beef cattle industry to produce solutions to solve the pain points of beef cattle industry. Every year, animal science and veterinary majors of all levels of universities, colleges and vocational schools enroll

more than 100,000 students. After 3-6 years of study, they become talent for and fill positions in relevant links of beef cattle industry.

In general, the value chain system of beef cattle industry in China has been basically formed. China's complete beef cattle industry chain system, which is composed of national core breeding farms, provincial bull breeding stations, breeding cow farms, fattening farms, slaughterhouses and social service institutions, has been formed; the national beef cattle standardization system, which includes beef cattle breed standard, fattening standard, feed raw material standard, production process standard, beef product quality and safety standard and laboratory testing standard, has basically taken shape.

2.3 Experience and deficiencies of China's beef cattle industry

Summing up the experience of 40 years' development of China's beef cattle industry, market drive, policy guidance, business model, technical support, financial support, foreign investment and other factors have played an important role in the development of China's beef cattle industry.

(1) The strong market driving effect of beef consumption demand. In 1980, Chinese GDP per capita was only 290 US dollars. It reached 959 US dollars in 2000, but then rose to 10,276 US dollars in 2019. With more money, consumers could buy more beef, which is the direct reason for the increase in beef consumption. Beef consumption per capital was 0.3 kg in 1980, while in 2019, the beef consumption per capita had been increased by 20 times to 6 kg.

(2) The important role of governmental industry policies and technology promotion system. Since China's Reform and Opening Up, a series of government policies had been launched such as the *1996 to 2000 National Farmland Restoration with Straw-fed Livestock Project Development Outline*, *Beef Cattle and Mutton Sheep Quality and Safety Promotion Plan (2003 to 2007)*, *National Main Beef Cattle Production Region Planning (2008 to 2015)*, *National Beef Cattle Genetic Improvement Plan (2011 to 2025)*, *National Development Program for Beef and Lamb (2013 to 2020)*, *National Herbivores Animal Husbandry Development Plan (2016 to 2020)* and *Guidance on Promoting the Development of Grass and Animal Husbandry*. These policies completed the regional layout of the beef cattle industry from the perspective of top-level design, and pointed out the directions for the beef cattle industry operators, which greatly accelerated the development of the beef cattle industry. The Chinese government also established a complete technology promotion system and trained teams of professionals from scientific research to production.

(3) The effective production organization pattern promoted the enterprise vigor and the farmer's enthusiasm and profitability of raising cattle. Different operation modes such as "family farm mode", "company plus farmer mode", "company plus cooperative plus technology mode" and so on were gradually formed in production, which enable the operating entities of cows, calves, stockers and feedlot cattle breeding to gain benefits.

(4) **Introducing foreign capital and foreign enterprises and integrating domestic finance and insurance industry.** Since the Reform and Opening Up, China has been increasingly open in the field of beef production and beef market access. Foreign-funded enterprises from Thailand, Australia, the United States, South Korea, Japan and other countries have invested in feed, breeding, processing, equipment and other important parts of the value chain in China in the form of sole proprietorship or joint venture. For example, Charoen Pokphand Group of Thailand first established a feed enterprise in China in 1979; Jarvis Manufacturing Inc. of the US established Jarvis Machinery (Beijing) Co., Ltd. in 2006 specializing in the production and distribution of livestock slaughtering equipment; Hancock Prospecting Group of Australia cooperated with New Hope Group of China to establish fattening and slaughtering processing plants for slaughtered beef cattle in Zhejiang Province of China. The introduction of foreign capital not only boosts China's beef cattle industry diversity, but also brings advanced international management concepts and technologies to China's traditional beef cattle industry, accelerating China's beef cattle industry to be in line with international standards.

As an asset intensive and disease risk vulnerable industry, the development of beef cattle industry needs the intervention of insurance industry and financial capital. In the past five years, with the scale expansion and quality improvement of the industry, a number of financial and insurance companies including "Haier agricultural finance", "PICC property insurance" and "China united property insurance" have joined the beef cattle insurance and financing, which provided strong risk and capital guarantee for the development of the beef cattle industry. Various government and commercial financial insurance companies have invested more than 10 billion RMB in China's beef cattle industry in terms of insurance and loans, providing a strong risk prevention and financial guarantee for the development of beef cattle industry.

(5) **Integration of advanced technologies across the globe and benchmarking international standards.** The rapid development of China's beef cattle industry benefits from the integration of standardized technologies and advanced management experience in the aspects of beef cattle breeds, genetic improvement, feeding management, disease prevention and control, environmental control, animal welfare, slaughter and processing and so on across the globe. Through multilateral and bilateral cooperation, China have introduced, learned and absorbed advanced technologies and experience in beef cattle industry globally, and benchmarked international standards, specifications and guidelines in beef cattle industry. In this way, it took less than 30 years for China's beef industry to reach a development level that developed countries spend 50 to 80 years to achieve.

(6) **Shortages in China's beef cattle industry.** Although, China's beef cattle industry has played an irreplaceable role in meeting the beef demand of Chinese consumers, it also has shortcomings. First of all, lack of large-scale farms. Cattle raised by 500 more heads scale farms account for less than 5% of the total. Second, disease risk remains the main factor

affecting the benefit of cattle feeding. Although China has earned great achievements on cattle disease prevention and control, current nationwide state of disease prevention and control is still serious, with brucellosis, foot and mouth disease, bovine tuberculosis, bovine viral diarrhea, infectious bovine rhinotracheitis and other disease epidemic situations still present in many places and prevalence increasingly complex, which require strengthened research and development, vaccines, approval, production and promotion. Third, the research and promotion of new practical technologies in the beef cattle industry still lags behind the production needs. New breeds, beef cattle feeding standards, cowshed design and construction, carcass segmentation standard still need to be researched and promoted.

2.4 Comparison of beef cattle industry development between China and Ethiopia

The development level of beef cattle industry in the early stage after China's Reform and Opening Up (based on data of 1980) and that in Ethiopia (based on data of 2017) share many similarities. From the macro perspective, the foreign exchange reserves of the two countries were close. From the perspective of industrial base, the current stock of Ethiopia was slightly less than that of China, but the cattle of both countries were mainly draft cattle. From the perspective of beef consumption, the total beef consumption and per capita consumption of Ethiopia were higher than that of China, indicating that Ethiopia has a better domestic beef consumption base; both countries aimed at increasing foreign exchange through export, and the export market was mainly the Middle East. The two countries were also highly similar in breeds, fattening and slaughter performance.

Through nearly 40 years of development, China's beef cattle inventory and beef production ranked third in the world. China's experience and technology can serve as reference for the development of Ethiopia's beef cattle industry with similar development foundation (Table 2-2).

Table 2-2 Comparison of macro basis and industrial conditions of developing beef cattle industry between Ethiopia at present and China in 1980

Indicator	Ethiopia (2017)	China (1980)
Macro basis		
National territory area (10,000 km)	1,104	960
Cultivated land area (10,000 ha)	1,320	16,593
Population (10,000)	10,500	98,705
Grain output (10,000 tons)	2,312	32,056
GDP total (100 million US dollars)	806	2,149
Foreign exchange reserve (100 million US dollars)	30	25
GDP per capita (US dollars)	873	290
GDP per capita ranking	161	95

(Continued)

Indicator	Ethiopia (2017)	China (1980)
Industrial base		
Cattle in inventory 10,000 head	6,000	7,200
Industrial function	Mainly draft cattle	Mainly draft cattle
Beef consumption		
Beef production total (1,000 tons)	459	269
Beef consumption per capita (kg)	3.2	0.3
Live cattle and beef consumption target	Mainly for earning foreign exchange through export	Mainly for earning foreign exchange through export
Beef and live cattle export market	The Middle East	The Middle East and the former Soviet Union
Breeds and fattening		
Predominant beef breeds for fattening	Local breed and Brahman	Local yellow cattle
Reproduction modes	Mainly local breeds natural mating	Mainly local breeds natural mating; some artificial insemination (AI)
Main energy feed	Corn, sorghum, etc.	Corn, wheat bran, etc.
Main protein feed	Soybean cake, etc.	Soybean cake, distiller's grains, cottonseed cake and other dregs
Main roughage	Straw and silage	Crop straw, natural forage and by-products
Hormone implantation in fattening period	Implantation allowed	Implantation banned
Feed additive industry	None	Relying on imports; just started in China
Formula feed industrial system	None	None
Performance at slaughter		
Finishing weight (kg)	225	240
Slaughtered weight (kg)	108	114
Meat per head (kg)	89	93
Marketing rate (%)	6	10

Data source: data organized by experts from the delegation group.

3 China's beef consumption and import

3.1 Consumption characteristics

3.1.1 The development and trend of China's beef consumption demand

In 2019, China's beef market was around 588 billion RMB^①, and the yearly beef consumption in China reached 9.25 million tons, which ranked 2nd around the world following the United States.

China's beef consumption entered a fast-growth period since 2012, and there is still huge room for growth. As China's middle class expands, Chinese consumption upgrading promotes the change of meat consumption structure. Chinese people's demand towards high quality animal protein keeps growing, especially for the demand of beef. In China, the consumption of beef, lamb and other livestock are increasing the fastest while pork's consumption is going down. The healthier red meat like beef and lamb will have sustained room for growth in the future. In developed countries, beef consumption shares stand at 18%-28% while in China this number is only 3%, which means there is still a lot of room for growth. MIG forecasts the growth of Chinese beef consumption will continue till 2025, with 2% year on year growth rate.

One of the main stimuli for the growing beef consumption is the fast growth of Chinese catering industry in recent years. The Chinese beef market is essentially a To-Business (2B) market. A majority of Chinese beef consumption comes from restaurants and processing food, which accounts for 54% and 30% of the total consumption, respectively. Only about 16% of consumption is from the households directly. The rapidly progressing catering industry in China has learned a lot of different ways of cuisine from their western counterparts, which spurs Chinese beef consumption. And Chinese hotpot is also an important way of beef consumption. Therefore, products in conformity to the required specification of restaurants and processing plants has higher liquidity in the market.

3.1.2 Widening of China's domestic beef supply gap

Restricted by natural conditions, urbanization and other factors, the beef cattle feeding industry in China has a slow increase in production capacity, which cannot meet the rapid growth of market demand. The gap between supply and demand continues to widen, and the import demand grows rapidly. In 2019, 74% of the beef consumed in China was self-produced, and the proportion of imported beef consumption exceeded 25% for the first time.

① Unless otherwise specified, all sources of data in this chapter are the Beef Industry Research Report of MIG.

3.1.3 Rapid growth of Chinese beef import demand

Since 2012, the Chinese imported beef market has been on the track of fast growth with over 29% year on year growth rate and the beef industry has been among the fastest developed industries. In the following 8 years, China developed into the biggest beef purchasing country in the world. Its purchase volume accounts for 1/8 of the total volume globally and it is playing a key role in the global beef trade system. Based on the data of China's beef market in 2019 alone, its average monthly import volume exceeded 100 thousand tons and new record is expected to be set (Figure 3-1). Therefore, China's imported beef industry is in a booming stage. Currently, China has overtaken United States and become the biggest beef import country in the world (Table 3-1). The Chinese imported beef industry is in full blossom with huge space of growth. China needs to import beef from across the globe to fill the demand gap in its market.

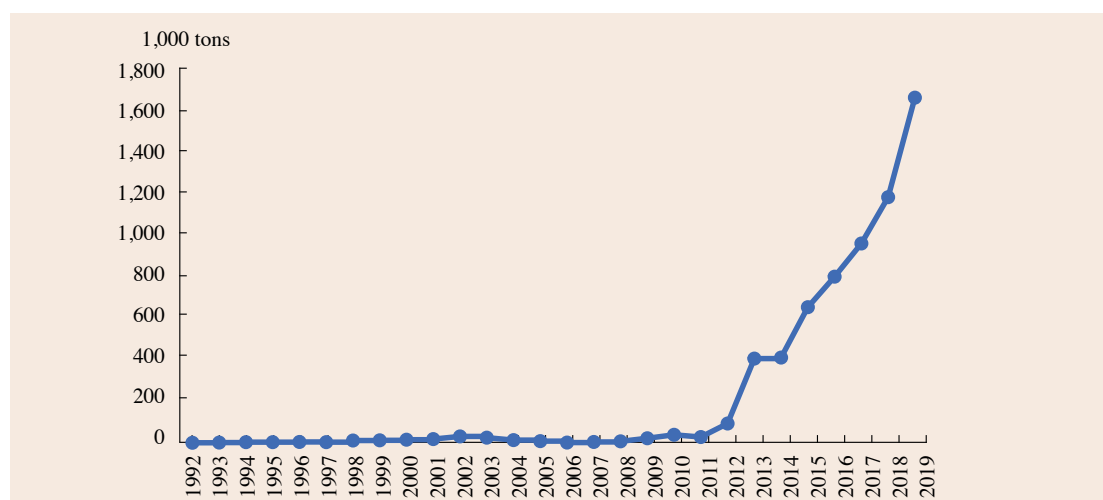


Figure 3-1 China beef Import volume 1992-2019

Table 3-1 Global beef import volume of major beef imports in 2014-2019 (1,000 tons)

Country (Region)	2014	2015	2016	2017	2018	2019
United States	1,337	1,528	1,366	1,358	1,373	1,387
Japan	739	707	719	817	835	853
China	417	663	812	974	1,200	1,686
China,Hongkong	646	339	453	543	560	356
Korea,South	392	414	513	531	560	550
Russia	932	622	524	516	495	401
European Union	372	363	368	338	370	341
Egypt	270	360	340	250	300	340
Chile	241	245	298	281	310	347
Canada	272	269	243	229	240	204
Mexico	206	175	188	196	210	189
Others	2,085	1,969	1,880	1,920	1,927	1,675
Total	7,909	7,654	7,704	7,953	7,380	8,329

3.2 Import market analysis

3.2.1 The development history and trend of China's imported beef market

The Chinese imported beef market has gone through three stages since its rapid growth in 2012:

(1) Dividend Period. During 2012-2014, due to the lower international price of beef and high profit of imported beef in China, a great deal of importers began to purchase beef overseas, which marks the start of fast growth of Chinese imported beef.

(2) Competition Period. During 2015-2016, driven by the high profit of imported beef, numerous companies joined in the party of imported beef business, resulting in oversupply of imported beef in a short period of time. As the market dividend shrank, the Chinese importers were reshuffled.

(3) Stability Period. During 2017-2018, as the gross profit margin is stabilized, the profit of imported beef is compressed and within a reasonable range with 3%-5% gross profit margin. As a result, the revenue of importers is decided by the market price and those large-scale importers took advantage of their market size and began to make a stable profit.

3.2.2 The import beef market scale and main supplier countries

China's major countries of supply comprise Brazil, Argentina, Uruguay, Australia, New Zealand and Canada. All combined accounts for 98% of the total supply volume. At the same time, China continues to open new channels for imported beef. Some smaller countries are given chances to export their products to China, such as Costa Rica, Ireland, Mexico, South Africa, Belarus and United States (Table 3-2).

Table 3-2 Major suppliers and supply volume of imported beef in China in 2019

COUNTRY	Import Volume (ton)	Proportion
Brazil	399,462	24%
Argentina	375,538	22%
Uruguay	314,159	19%
Australia	297,530	18%
New Zealand	221,258	13%
Canada	14,640	1%
Others	63,710	4%

A majority of grass-fed beef in China comes from South America while grain-fed beef comes from Oceania and North America. Owing to the mature processing technique of beef in China, China prefers to purchase the grass-fed raw-material level beef which is lower in price to have them further processed or used by Chinese restaurants. Therefore, beef import from South America accounts for more than 60% of the total volume.

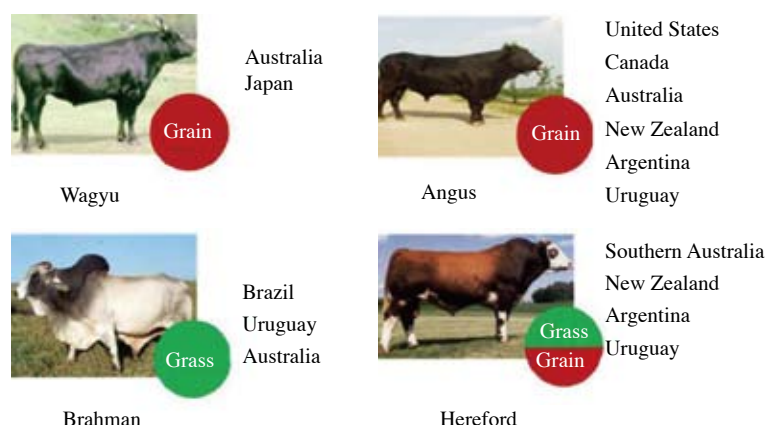


Figure 3-3 Main beef cattle breeds imported by China

3.2.3 High concentration of main importers

China's beef importers are relatively highly concentrated, with the top 20 importers accounts for 54% of the total purchase volume. Because of the developed commerce finance in China, a large percentage of importers purchase beef for the real users of beef through financial means. Generally, large-scale importers tend to cooperate with the comparatively matured main production countries (Australia, New Zealand, Uruguay, Brazil and Australia) to facilitate large-scale trade and gain scale advantages while importers from small countries are likely to choose to team up with the medium-scale importers to help them promote their brand and implement precise marketing strategy. Under the background of expanding import scale, China's importers may become more and more concentrated in the future, so as to further strengthen the global bargaining power of buyers. Under the industry background of expanding import scale, importers in China may become more centralized to further enhance the pricing capability of global purchasers (Table 3-3).

Table 3-3 Main importer of Chinese beef market

Importer	Share	Class
Optimize Integration Group Foods (Maanshan) Co., Ltd.	12.5%	Agent
COFCO JOJOK Foods (Tianjin) Co., Ltd.	5.1%	Importer
PMI Food (Beijing) Co., Ltd.	3.9%	Importer
Shanghai Win-Chain Management Co., Ltd.	3.7%	Importer
Qingdao Nature Forplus Foods Co., Ltd.	3.1%	Importer
Qingdao Soar Dragon Import & Export Co.,Ltd.	2.7%	Importer
Beijing Ershang Group Dahongmen Meat Food Co., Ltd. Trading Affiliate	2.5%	Importer
JOC Great Wall Co., Ltd.	2.2%	Agent
Chongqing Trading Company Import and Export Co., Ltd.	2.1%	Importer
Optimize Integration Group Co., Ltd.	1.9%	Agent
Qingdao United Huatong Commercial Co., Ltd.	1.9%	Importer

(Continued)

Importer	Share	Class
Shanghai ESENAGRO Foods Co., Ltd.	1.7%	Importer
Shanghai Moshine Food Co., Ltd.	1.6%	Importer
Heilongjiang Grand Farm Meat Co., Ltd.	1.5%	Importer
Zhejiang Huiling Foreign Trade Co., Ltd.	1.5%	Importer
Chongqing Jinshagnxu International Commercial Co., Ltd.	1.4%	Importer
Yueda Supply Chain Management Co., Ltd.	1.4%	Importer
Qilu Transportation Qingdao FTZ Development Co., Ltd.	1.3%	Agent
Qingdao Eimskip Public Bonded Warehouse	1.1%	Agent
NGE LOGISTICS (CHINA) LIMITED	0.9%	Agent

3.2.4 Main imported breed specifications

China's beef consumption has just started, and the demand for high-end beef is relatively small. The cost factor is one of the important factors considered in the Chinese market. Beef purchased by China is concentrated in the parts suitable for deep processing and Chinese catering. At present, the main strategy of South American countries to enter the Chinese market is to produce large pieces of beef suitable for processing plants and enter China at a lower cost. In generally, the consumption scale of processing plants is large, amounting to around 1,000-5,000 tons/year, which meets the demand of high turnover of slaughterhouses. In addition, it should also be noted that the consumption of steak and other parts at the restaurants is too small to be quickly digested, but there is a higher profit margin in them (Table 3-4).

Table 3-4 Chinese beef market main imported varieties specifications

Name	Import Qty (ton)	Price CIF (USD/kg)	Outlet
80-90VL FC SC	5,320	4.10	HOT POT / DEEP PROCESSING
BREAST	3,252	4.30	HOT POT
KNUCKLE	2,237	5.00	DEEP PROCESSING
TRIMM 65 CL	1,873	2.25	HOT POT / DEEP PROCESSING
SHIN/SHANK	1,433	5.15	RESTAURANT / FMAILY
STRIPLOIN	1,382	6.80	RESTAURANT / FMAILY
OUTSAIDE FLAT	1,186	5.50	DEEP PROCESSING / RESTAURANT
THIN FLANK	1,143	3.90	RESTAURANT / FMAILY
CHUCK	1,042	5.70	RESTAURANT / FMAILY
RUMP	883	5.50	DEEP PROCESSING / RESTAURANT
OYSTER BLADE	795	7.00	DEEP PROCESSING / RESTAURANT
CHUCK ROLL	730	6.20	DEEP PROCESSING / RESTAURANT
CUBE ROLL	603	7.00	RESTAURANT / FMAILY
NECK	474	4.00	DEEP PROCESSING
RIBS	408	7.50	RESTAURANT / FMAILY
BLADE	305	5.70	DEEP PROCESSING

(Continued)

Name	Import Qty (ton)	Price CIF (USD/kg)	Outlet
CHUCK TENDER	273	5.45	RESTAURANT / FMAILY
TOPSIDE	262	6.00	DEEP PROCESSING / RESTAURANT
TENDERLION	124	9.70	DEEP PROCESSING / RESTAURANT / FMAILY

3.2.5 New models of China's global beef shopping

In order to expand the beef supply to China's domestic market, in addition to importing beef directly, Chinese enterprises and institutions "go out" to enable new supply models.

(1) **Purchase overseas plants.** In order to have stable access to beef with lower price, Chinese companies are going to merge and acquire some slaughterhouses in Australia and South America.

(2) **Invest in oversea plants.** Some Chinese importers will buy shares from the overseas slaughterhouses to increase the production to take more orders.

(3) **Merge & acquire farms.** Some importers choose to purchase farms and cattle from oversea and then process them through slaughterhouse and finally export them to China.

(4) **Build plants.** It normally happens in the smaller supplier countries like Inner Mongolia or South Africa. Their processing techniques lag behind their Chinese counterparts, but they have lower cost in labor and construction and enjoy supports from the local government and the Chinese government. The Chinese exporters bring their advanced techniques and technicians to these countries and build plants, apply China's advanced techniques, and produce products according to the proper specifications for the Chinese market.

3.2.6 The global beef production capacity

Beef is a slowly developed livestock resource. It is easily influenced by nature, has long growth period, its production capacity cannot be enhanced in short term via technology or other means, and its limited resource. So, its value is more stable than other animal proteins. When choosing fattening meat cattle breeds, the priority is its quality of producible meat. The majority of products from the main export countries are grain-fed and grass-fed cattle. Grass-fed cattle have higher survival rate, better disease resistance and drought resistance, which lowers the cost of breeding. Brahman cattle is a typical example of this kind. Grain-fed cattle is able to effectively digest and turn its meat into the high-end marbled beef. It also has higher production rate which maintains improvement. Angus cattle is a typical example of this kind which has high breeding cost and margin which is appropriate to be sold on the medium to high-end market in the developed countries.

Global beef production capacity continues to grow. Since 2014, the global beef production has entered a new period of uptrend. The top three countries in beef production capacity are the

US, Brazil and EU. China ranks fourth. United States, with the biggest beef production, on the one hand exports some cuts with high value; on the other hand, supplies a great deal of minced meats to China to fill its huge demand in the hamburger market. More than 80% of the Brazilian beef production are consumed domestically. Only about 20% are being exported. But Brazil is still one of the biggest beef exported countries. In the future, US and Brazil will increase both in production and export. In the next few years, China will keep holding the first spot as the biggest beef buyer in the world and will play a more influential role in the global beef trade (Table 3-5).

Table 3-5 Global beef production capacity (1,000 tons)

Country	2014	2015	2016	2017	2018	2019
United States	11,075	10,817	11,507	11,943	12,286	12,384
Brazil	9,723	9,425	9,284	9,550	9,900	10,200
European Union	7,443	7,684	7,880	7,863	7,915	7,878
China	6,890	6,700	7,000	7,260	7,325	6,670
India	4,100	4,100	4,200	4,250	4,300	4,270
Argentina	2,700	2,720	2,650	2,840	2,950	3,125
Australia	2,595	2,547	2,125	2,149	2,300	2,432
Mexico	1,827	1,850	1,879	1,925	1,960	2,030
Pakistan	1,685	1,710	1,750	1,780	1,800	1,820
Turkey	1,245	1,423	1,484	1,399	1,400	1,374
Russia	1,375	1,355	1,335	1,336	1,340	1,342
Others	10,156	9,379	9,384	9,329	9,402	8,117
Total	60,814	59,710	60,478	61,624	62,878	61,642

3.3 Entering conditions

3.3.1 Essential conditions

(1) **Owning a Chinese customs authorized slaughterhouse.** China implements the access system to all the countries. Chinese customs has a list of all beef processing plants of all countries entitled to export beef to China. Enterprises not on the list will not be authorized by Chinese customs and enter the Chinese market. In particular, the basic standard to the Chinese customs authorized slaughterhouse is that the country's OIE report shows no disease outbreak in two years, and the quality requirements of China's meat inspection and quarantine are met; the exporter country should provide the certificate of origin for the products and assign specialized veterinarian to issue health certificate for the export products.

(2) **Specific process:** ① The exporting country submits a formal request for the export of meat products to China Customs. If the animal health status of the country meets the requirements,

China Customs initiates the process by presenting a questionnaire on the SPS (sanitary and phytosanitary) control and inspection system of the applicant country. ② The exporting country provides the corresponding technical documentation, including laws and regulations, structure of the veterinary health services, quality management control system, detection and monitoring of animal epidemics, waste management, etc. ③ China Customs carry out an analysis and risk evaluation of the documentation submitted by the authorities of the exporting country. If documentation is acceptable, a delegation of experts is sent to the exporting country to conduct further field investigations. ④ The two countries start a bilateral “Sanitary and Phytosanitary High-Level Dialogue” to negotiate the text of the “Protocol on Veterinary and Health Requirements for Meat to be Exported to China” as well as the format of the “Export Health Certificate”.

(3) Main provisions in the agreement standard: ① Exporting authorities provide China Customs with the management regulations and procedures affecting processing plants and the control system related to diseases. ② Exporting authorities officially confirm that the country is an epidemic-free area. ③ Exporting authorities ensure traceability (all meat products need to originate in the exporting country) and protection against specified diseases. ④ Details on the registration of exporting facilities by the Certification and Accreditation Administration of the People’s Republic of China (CNCA). ⑤ Detailed functions to be carried out by official veterinarians in the exporting country (ante-mortem and post-mortem quarantine and inspection and certification). ⑥ Requirement that slaughtering and processing plants can only operate meat products that comply with requirements. There should be exclusive storage areas within cold storage houses for products to be exported to China. ⑦ Packaging conditions, labelling and marks. ⑧ Transport, storage and manipulation conditions (storage temperature). ⑨ Details on the Export Health Certificate accompanying each container. The exporting side should provide AQSIQ with signatures of veterinarians authorized to issue health certificates. ⑩ China Customs has to be notified of any infectious or contagious episode and exports will be stopped immediately. Authorities in the exporting country have to work closely with China Customs in order to resume exports of the affected products.

3.3.2 Cost requirements

Beef in China has the property of commodity. In the condition of pure competition, low cost is the fastest way to gain competitive advantage. The average CIF price of China’s imported beef is 4.5 USD/kg, with a main price range of 4.3-4.9 USD/kg. This indicates that China is still a cost-oriented market with preference for raw material level grass fed beef, and beef products conforming to this price range can be recognized in the Chinese market. The demand prices of different parts are shown in Table 9. Being in line with the average demand price of China’s products in the table means better chance to gain a competitive advantage in the Chinese market quickly (Table 3-6).

Table 3-6 China's preference purchasing products list

Product	Volumes(ton)			AvG CIF China - USD/ KG		
	201901	201811	exchange	201901	201811	exchange
Shin/Shank	13,685	13,857	-1%	5.9	5.02	18%
Brisket	7,901	8,131	-3%	5.4	5.08	6%
Flank	6,373	5,738	11%	3.96	4.01	-1%
Shoulder	10,919	6,702	63%	4.47	4.4	2%
Trimming	4,218	6,013	-30%	3.34	3.14	6%
Knuckle	5,267	5,354	-2%	4.85	4.84	0%
Neck	4,436	4,030	10%	4.36	4.27	2%
FFQ 80~90VL	3,893	4,237	-8%	3.71	3.7	0%
Outside Flat	2,641	2,899	-9%	4.95	4.9	1%
Chuck	4,024	3,016	33%	4.39	4.79	-8%
Striploin	2,473	2,820	-12%	—	—	—
Rib Eye	2,632	2,212	19%	—	—	—
Rump	1,284	909	41%	4.89	5.2	-6%
Eye Round	1,213	1,188	2%	5.89	5.99	-2%

3.3.3 Quality requirements

In the market of Chinese beef consumption, family consumption accounts for a small portion of the total consumption. The rest reach the consumers through restaurants or processing plants. In particular, raw material level beef purchasing is centralized, low in price, can quickly adapt to price changes with processing techniques, and price sensitive. Restaurant level beef purchasing is scattered, high in price and has complicated pricing system. In recent years, the restaurant level purchasing has been rising every year, and the proportion of family consumption in total consumption has been rising too.

The meat market for restaurants is saturated due to the high supply from Australia and Canada, and China is hard to find a profit margin in this kind of product and the countries like Uruguay and Argentina are breeding their own cattle for this, so fierce competition is expected in the market and restaurants (Table 3-7).

Table 3-7 Imported beef products

Exp. Beef type	Characteristics	Cuts	Origin	Chinese imported shares	Outlets
Raw Material Level 	Being deep processed before enter the market; low price; high production; standardized; cost-sensitive	minced, chuck, shank, neck, brisket navel plate, beef rump, brisket	South America or India	77%	Pinyao Beef, Niutoupai, Sanlin Foods, Ziyen Foods

(Continued)

Exp. Beef type	Characteristics	Cuts	Origin	Chinese imported shares	Outlets
Restaurant Level 	Be used by family, canteen, shop; available for direct cooking; includes grain-fed, grass-fed, Angus and etc. high-end product	sirloin, rib eye, chuck eye, short loin, bone-in short ribs, tenderloin	North America, EU and Oceania	23%	Wowprime, Luxury hotel, Asian Barbecue

3.3.4 Market comparison

China's major beef importer countries have adopted a differentiated market strategy in the Chinese market. United States and Canada are known for its high-quality grain-fed beef product and widely recognized in Chinese market for their high level cutting technique and rating system. Australia, because of its offering of multiple ranges of meat and stable quality, gains stable market access for both its raw material and restaurant level products; and through strong market promotion ability, Australia's national brand is marketed in-depth. South America countries keep increasing their influence on the Chinese market by its cost advantage and advanced processing technique to improve their processing and develop more raw materials for Chinese processing plants. They offer stable supply in order to increase their influence in the Chinese market.

3.3.5 Cases: Inner Mongolia meat entering China

Inner Mongolia beef and lamb products were exported to China in 2015, gaining recognition from the China market for its low price and quality and attracting a plenty of Chinese importers. Due to the low cost of land and labor in Inner Mongolia, scores of Chinese small-medium exporters invest or buy the meat factory there and they were granted permission to produce beef, lamb and horse meat to China.

However, due to the breakout of peste des petits ruminants disease, or PPR, in 2015, Chinese government closed its gate to the import of beef and lamb from Inner Mongolia. The plants invested by Chinese businesses continued in operation and took another approach to export the cooked beef and lamb to China (cooked beef and lamb were still permitted). At present, Mongolia has become the largest exporter of cooked beef and lamb, and the only and biggest exporter of horse meat to China.

We can learn from this case that: ① Low cost of land and labor as well as preferable policy are the attractions to Chinese investors to build plants or create jobs there. ② The control of the animal disease and its relationship with the Chinese government are the key factors to its prospect of Chinese market. ③ There is always demand for meat products with cost advantage in Chinese market.

4 Field research of beef cattle industry value chain in Ethiopia

After several months of joint preparation, FECC and ATA sent a delegation of 22 members to Ethiopia for field research from May 5 to 17, 2019. Members included specialists in agricultural policy, agricultural economics, beef breeder, feed fattening and market, enterprises representatives in vaccines, feed, slaughter processing, cattle by-products processing, and delegates from Chinese enterprises in Ethiopia with strong interest in Ethiopia's agricultural investment. The research activities have also been actively supported by the International Trade Centre (ITC) Partnership for Investment and Growth of Africa (PIGA) project.

In close cooperation with ATA, the delegation conducted nearly 40 research activities during their time in Ethiopia. The delegation conducted in-depth interviews with relevant departments such as the Ministry of Agriculture, the Ministry of Trade and Industry, the Investment Committee, scientific research institutions such as the National Animal Genetic Institute, industry organizations such as the Meat Producers and Exporters Association, banks, international shipping companies, the World Bank and the Gates Foundation office in Ethiopia and other relevant institutions and international organizations. Two foreign beef cattle slaughtering and fattening enterprises, Allana of India and Verde Beef of South Africa, and one comprehensive agricultural industrial park were researched on site. Important links of value chain such as beef cattle breeders, feed mills, large and medium-sized fattening farms, large and medium-sized slaughterhouses and beef cattle trading markets were visited. The group also visited the business office of the Chinese Embassy in Ethiopia and had an in-depth exchange with the Chinese-funded enterprises that had been stationed in Ethiopia for a long time.

The Ethiopian government also attached great importance to this research trip. During the delegation's visit, the Minister of Agriculture and State Minister personally listened to the introduction of Chinese experts on the development experience of beef cattle value chain in China, as well as the beef consumption demand and market development in China. State Minister of Agriculture in charge of livestock work briefed the delegation on Ethiopia's veterinary system and disease prevention and control. They expressed their hope to learn from China's beef cattle industry development experience and to carry out extensive cooperation in the areas of technology, capacity-building and investment. Commissioner of the Ethiopian Investment Committee personally introduced Ethiopia's foreign investment policy to the delegation and said that he would actively give policy support (Figure 4-1).

Through research, they gained a thorough understanding of the development status of beef cattle breeding, feed, vaccines, fattening, slaughtering, processing, export and other key links of the value chain in Ethiopia, as well as the business environment of Ethiopia, and collected a wealth of first-hand information.



Figure 4-1 The Minister of Agriculture of Ethiopia and Commissioner of Ethiopian Investment Committee met with the delegation respectively

4.1 Macro support

The Ethiopian government has high expectations on and gives active support to the development of beef cattle industry value chain. It is reported that Ethiopia has focused on the processing of cattle by-products such as leather in the past few years, and more on animal husbandry production after Prime Minister Abiy Ahmed took office. Ethiopia cattle have a large stock, but the beef production is low and the quality is far from satisfactory. If these challenges can be addressed, Ethiopia will have great potential. The Ethiopian government has carried out general planning through GTP II and Livestock Master Plan. It is hoped that the potential of animal husbandry will be developed through advanced science and technology, suitable breeds and market-oriented production. Enhancing the global competitiveness of animal husbandry products by a large margin. By 2025, it will be the top livestock exporter in Africa.

The Ethiopian government believes that the market is very important for the development of beef cattle industry. China is a very big demand market, and Ethiopia is committed to the export market. Ethiopia is eager to improve its ability to export beef to China.

The departments responsible for Livestock Resources Development in the Ministry of Agriculture of Ethiopia (MoA) consist of six parts: Quality Inspection and Quarantine Monitoring, Vaccine for Disease Prevention and Control, Meat Export, Veterinary Public Health and Traceability, totaling 240 people, in cooperation with government departments, NGOs and the private sector. MoA is responsible for formulating strategies, carrying out disease prevention and control, ensuring animal health, conducting import and export inspection, quality inspection and the certification of export slaughterhouse qualifications. The Federal Veterinary Service mainly formulates laws and regulations, including certificate issuance, and authentication. Regional veterinary services are responsible for implementing relevant policies, such as certain diseases that can be transmitted across borders. Regional veterinary services need to prevent the spread of such diseases.

Ethiopia has established a primary animal identification and traceability system (LITS), as well as a quarantine inspection and certification system, are preliminarily completed. The Ethiopian government attaches great importance to the issue of inspection and quarantine and hopes to work with China to solve it. In order to promote exports, the Ethiopian government intends to build disease-free areas and encourage foreign investment to enter the field of disease prevention and control.

The relevant industry associations and institutions in the Ethiopia beef cattle industry value chain are also active. For example, the Feed Industry Association has 80 members, including feed factories of all sizes, equipment importers and livestock farms. Meat Producers and Exporters Association has 13 members and basically covers all large meat export enterprises. Livestock Export Association has 50 members to provide services for livestock production, logistics and market. ACDI VOCA, an international NGO organization, concerned with agricultural food safety, began to set up a feed project in Ethiopia in 2009 to study the resources and development of animal feed in Ethiopia, and to conduct training in feed production and fattening management.

Ethiopia's relevant scientific research institutions have a certain foundation. For example, the National Animal Genetic Improvement Institute (NAG II) has been established to lead and coordinate national livestock genetic improvement policies, strategies and programs with relevant federal and regional institutions and the private sector. The Ethiopian Agricultural Research Institute currently has 12 national livestock research institutes, including three research institutes specializing in red meat. Its red meat research is now formulating production standards, and the beef cattle research aims at selection, breeding and finishing weight. A total of 15 universities in Ethiopia have established animal health related majors. For example, Addis Ababa University has a veterinary medical school, and also includes animal production and animal health disciplines.

4.2 Cattle breeds

There are about 27 indigenous breeds of cattle in Ethiopia. They are dual purpose cattle commonly used for draft, milk and meat purpose. They are drought tolerant, with relatively good survivability, but they are small in size and slow in growth. From the field investigation, it was found that the daily gain rate of local cattle could reach 0.7-1 kg/day in satisfactory nutritional conditions, and the body weight before slaughter was generally 250-300 kg.

Some respondents also said that Boran cattle, which can be used for both milk and meat, can weigh up to 600-650 kg. Field research also found that there were large hybrid breeds in the trading market (Figure 4-2). For example, the left picture shows cattle in a large trading market near the capital. On the right is the crossbred cattle (Local X Holstein-Frisian), 800 kg. This kind of cattle was traded in April 2019 for 98,000 ETH (about 20,000 RMB at current price).

Among cattle types seen on the spot, the breeds of cattle are mixed. Cattle of different breeds,



Figure 4-2 Large sized cattle seen during field visit

genders and ages are kept together. The indiscriminate cross-breeding among different breeds of cattle is expected to lead to serious genetic erosion, causing the decline of growth rate and disease resistance of cattle, which is not conducive to achieving the goal of efficient production of beef cattle (Figure 4-3).



Figure 4-3 Cattle herd leaving for grazing

At present, the livestock research in Ethiopia is relatively weak. Ethiopia is building a national animal genetic improvement institute (NAG II) to carry out breed improvement work. At the Addis Ababa University and in Hawassa University, there are veterinary departments to carry out relevant research on animal health, but the overall technical strength is still very weak. There are also some introduced dairy (Holstein-Frisian and Jersey) and dual purpose (Simmental) cattle breeds in Ethiopia. The improvement of beef cattle breeds in Ethiopia started relatively late. Brahman cattle were used to improve local cattle breeds 20 years ago, but the result was not satisfactory. The frozen semen used in the improvement at that time has been preserved so far. The popularization and success rate of artificial insemination (AI) technology in Ethiopia is very low. Shortage of inputs such as liquid nitrogen, poor frozen semen transportation facilities and poor handling, a lack of skill by most AI technicians etc. are the major reasons.

The National Animal Genetic Improvement Institute (NAG II) is the main body responsible for leading and coordinating national livestock genetic improvement activities in Ethiopia. At present, the main work is to promote the National Animal Breeding Improvement Program, import some inputs needed for artificial insemination, establish animal genetic improvement database, and carry out technical training. At the same time, some work has been carried out to improve local breeds of cattle with Holstein cow, and Jersey cattle. During the visit to NAG II, the delegation found that the equipment for experiments and research is relatively outdated, and the frozen semen production equipment, tools and methods used are mainly from abroad. Superior local Boran bulls are selected and sent to NAG II for semen collection. After collection, the semen is processed and frozen and distributed to farmers for artificial insemination use. However, unlike dairy, artificial insemination is not commonly used for beef cattle breed improvement for various reasons.

During the field visit to Modjo, the delegation visited beef cattle fattening farm where four of the five cattle were crossbreds of Holstein-Friesians and the local breed. The size and growth rate of the crossbreds is higher compared to local breeds. According to farmers, market price of these hybrid cattle was at least 2-3 times higher than that of local cattle, hoping to turn their cattle into this way. This shows that crossbreeding is welcomed by local farmers in the area. All the places visited are eager to carry out technical cooperation and capacity building with China in variety of cattle breeding and improvement.

4.3 Fattening and feed

In terms of fattening, usually only cattle go through fattening for export purposes. The livestock production system and husbandry practices in highland and lowland parts of Ethiopia vary greatly. The highland feeding system rarely uses commercial feed except in areas where fattening and dairying is practiced. In this system most cattle are fed with crop residues and/or graze outdoors freely. Male cattle from the highlands is mainly used for draft and usually eliminated after 6 to 7 years of traction service and supplied to the local cattle market. Ethiopian natives like to eat raw beef and have a chewy taste, which is totally different from the international market demand. The price of beef on the local market is high, and usually go up during festivals. A cattle weighing about 500 kg could be sold at 80,000 Birr (around 11,000 RMB). Traditionally, farmers usually fatten cattle for six months to one year. In lowland feeding systems, calves live with cows from birth to weaning breast milk feeding and forage grazing are the main methods. After weaning, grazing in rangeland is the main method. No concentrate supplement is fed at all. Some of the young bulls from this system are supplied to the highlands for traction, and a small part as shelf cattle purchased by fattening farms for both domestic and export market.

Cattle used for fattening are generally about 2 years old and weigh in the range of 110 to 160 kg. The price purchased by fattening farms is about 40 Birr/kg. After at least three months of fattening, they finish and reach slaughtering weight of 270 to 280 kg and slaughtered. The average

slaughter rate was about 50%. These fattening cattle are mainly supplied to the Middle East market, which prefers young cattle and does not require weight deliberately.

The number of feedlot farms is limited and small in Ethiopia. The number of highland fattening farms is small; while lowland fattening farms are large in number and mainly located along the capital Addis-Djibouti Port, serving mainly for export. Some foreign-invested fattening farms are emerging in Ethiopia, such as the Verde Beef fattening farm of South Africa, which uses modern fattening technology and equipment, with a large scale of construction, and uses high concentrate level and monensin to fatten beef cattle, so as to ensure that fattening cattle are fattened and slaughtered at the right time. The delegation also visited many local fattening farms because of their considerable benefits and strong desire for expansion and development (Figure 4-4).



Figure 4-4 Verde Beef fattening farm

On the feed side, premix/additives as core raw materials are heavily dependent on imports. Ethiopia feed supply for beef cattle is seriously inadequate. Estimated by the Ethiopian Feed Industry Association, the current stock of beef cattle in Ethiopia requires 104 million tons of feed per year. Concentrate supplements accounted for 5.4%, about 562 million tons. However, the actual production of concentrate supplements for beef cattle in Ethiopia is less than 9,000 tons. The proportion is less than 0.2%. At present, Ethiopia Feed Processing Plant is mainly

divided into private enterprises and farmers' organizations (cooperatives), the former occupies 70% of the market share. The production of poultry feed (66%) is the main method. The second was dairy cow feed (23%). Farmers' organizations mainly produce ruminant feed (97.5%). Beef cattle feed accounted for 56.4%. Dairy cattle feed accounted for 43.6%. Nearly 60% (5,400 tons) are produced by farmers' organizations. In the process of beef cattle raising, the farmers seldom purchase full price materials, and most fattening farms purchase concentrate and roughage to prepare their own mixed diets, while larger fattening farms purchase premix, while some family fattening farms do not use premix.

At present, the main roughage feed resource in Ethiopia is forage (very few uses alfalfa) and crop residues such as teff, barley and other crops. The raw materials for producing commodity feed include energy feed. Protein feed and vitamin mineral premix, among them, Energy feed mainly includes corn, wheat bran, low-quality flour, rice bran, chickpea bran and molasses. Protein feed is obtained from by-product of oil processing industry including soybean cake, cottonseed cake, flaxseed cake and peanut seed cake. The acquisition of these ingredients depends on the growing area of the crops and processing industry of edible oils. Maize in Ethiopia is mainly planted in the northwestern and southern regions and is basically used for food. The yield of maize in Ethiopia vary greatly according to rainfall distribution, with an average yield of 3.9 tons per hectare, which is less compared to the world average yield of 5.1 tons.

In addition to feeds listed, mineral and vitamin feed determines the quality and profitability of fattening. Among them, stone powder (limestone accounting for 50% of the weight and 20% of the value of ruminant premix), salt and meat and bone meals are produced locally in Ethiopia. The rest of the vitamins, minerals and amino acids additives cannot be domestically produced and can only rely on imports. At present, 12 importers import from five countries, and Europe is the main exporter.

4.4 Prevention and control of epidemic diseases

With respect to epidemic diseases, the prevention and control system of epidemic diseases is not perfect, the supply of vaccines is insufficient, veterinary drugs are scarce, and the cost is high. After years of construction and development, Ethiopia's veterinary health system has been initially built, involving quarantine monitoring, vaccine for disease prevention and control, meat export inspection and quarantine, veterinary public health and traceability management. Nevertheless, Ethiopia's epidemic disease prevention and control still lags far behind international standards. The quantity and quality of vaccines produced by NVI cannot meet the requirements; foot-and-mouth disease, bovine pleuropneumonia and brucellosis are the three most important infectious diseases in Ethiopian beef cattle industry.

Foot and mouth disease can cause death of calves and economic loss of adult cattle. Globally, foot

and mouth disease virus can be effectively controlled by regular vaccination. During the field visit to NVI, the delegation learned that in Ethiopia, there are 3 serotypes: SAT 2, O and A. Study by Admassu (2015) points out that the positive rate of foot-and-mouth disease in Ethiopian beef cattle ranged from 24.6% to 44.2%; and serotypes in Ethiopian beef cattle also include SAT 1 and SAT 2. The domestic FMD vaccine demand is about 3 million. NVI is able to provide 500 thousand, and the rest are mostly imported from Botswana or aided by NGO organizations. In 2019, the Ethiopian government promulgated the national regulations for the prevention and control of foot-and-mouth disease. All cattle for export shall be immunized, and a 50% subsidy policy for foot-and-mouth disease vaccines is implemented. Individual farmers can get vaccines free of charge, Private enterprises need to buy on their own. Vaccine costs are generally less than \$1.

Contagious Bovine pleuropneumonia (CBPP) is a highly infectious disease that occurs in African cattle. It is the second most major trans-boundary animal disease after African rinderpest. Report by Nejash et al., (2017) shows that across different regions, the positive rate of serum samples from cattle ranged from 0.4% to 96%. A mortality rate of 24.5% was reported. The high morbidity and mortality rate of CBPP caused great economic losses to cattle production in many areas of Ethiopia and restricted the international trade of live cattle and beef products. It is estimated that the annual economic losses of beef cattle industry in Ethiopia due to CBPP exceeded 8.96 million US dollars (Abdela and Yune, 2017).

Brucellosis can also cause serious economic loss in the animal production sector and has public health concern as well. Animal production system and environmental conditions have greatly affected the transmission of Brucella infection. Researchers in Ethiopia have carried out a large number of studies and investigations on the epidemic pattern of Bovine Brucellosis and have found that the serum prevalence of Brucella in traditional beef cattle feeding system is much lower than that in intensive feeding system. Study by Haileselassie et al. (2010) shows that the incidence of brucellosis in the intensive feeding system ranges from 7.7% to 50%, with an average of 23.3%. Study by Teshager et al. (2014) shows that in traditional feeding system, incidence of brucellosis in cattle ranges from 0.2% to 22%, averaging 4.4%. However, the delegation failed to find information on the measures taken by the Government of Ethiopia against Bovine Brucellosis.

Lumpy Skin Disease (LSD) is an infectious bovine viral disease caused by Poxviridea Capripoxvirus virus. LSD was first reported in Ethiopia in 1981 and subsequently became endemic. Study by Molla et al. (2017) and other studies show that this disease is prevalent in all 9 regional states and 2 municipalities with varying incidence rates. The incidence is lower in the hot and dry lowlands and higher in the warm and humid highlands. The LSD outbreaks are also seasonal. Generally, the incidence rate reaches its peak in October each year and its lowest level in May.

The incidence rates all diseases in Ethiopia is different. The incidence rate is low in hot and dry lowland areas, while in warm humid plateau areas, the outbreak is seasonal. Generally, the

incidence rate reaches its peak in October every year and it falls to a low level in May. According to the study by Ayelet et al. (2014), the incidence and mortality of LSD in 2,174 local zubus in Ethiopia were 13.61% and 4.97%, respectively. LSD control can be achieved by vaccinating, restricting animal movement and killing infected and exposed animals. However, this requires adequate financial, infrastructural and human resources, as well as support from information systems. The existing conditions in Ethiopia cannot support the implementation of all these measures. Therefore, vaccination has been used for many years as the most important method to control LSD. However, the results of a survey conducted in Western Oromia (Abera et al., 2019) show that existing LSD vaccines are poorly controlled in Ethiopia. In order to prevent and control the spread of LSD disease in beef cattle, more targeted vaccine products need to be developed.

On veterinary medicine side, the delegation learned that NVI was currently building veterinary drug production workshops, and the specific production volume could not be estimated. Veterinary drugs are mainly imported, most of them are Chinese products, and they are facing the same dilemma as vaccines.

4.5 Slaughtering, processing and export

Ethiopia has 13 slaughterhouses for the export of red meat. The desired annual slaughter capacity of these slaughterhouses is 150,000 tons (Table 4-1). However, the country's current export volume is only 22,000 tons. The slaughterhouse is an order-based production, which also shows that the above slaughterhouse orders are insufficient and the production capacity is excessive.

During the field visit, the delegation visited Frigorifico Boran Foods PLC in Ethiopia. The company was built in 2017 by Allana Group of India with an investment of more than 60 million USD. The annual slaughtering capacity is 1 million cattle and 3 million sheep. This company has advanced equipment and conditions that meet quality requirements of the export market. However, the production was based on orders. Only when beef orders are received will production be carried out. If the number of single shift production is small or if continuous production is not possible, or when the established large-scale capacity is started, it will result in higher production and higher processing costs. During the visit there, the company did not start large-scale slaughtering of beef cattle. Its actual production capacity had not reached 10% of the designed production capacity (Figure 4-5).

The delegation visited a number of local invested slaughterhouses, all of which expressed a strong willingness to cooperate. However, the infrastructure of these slaughterhouses is weak such as transportation facilities for live cattle, preservation facilities for frozen meat and slaughtering and processing facilities. In addition, it is very important for slaughterers to obtain a stable supply of cattle, which involves the capital turnover efficiency of slaughterers and the scale effect brought by the continuous operation of the assembly line. However, according to the field research results,

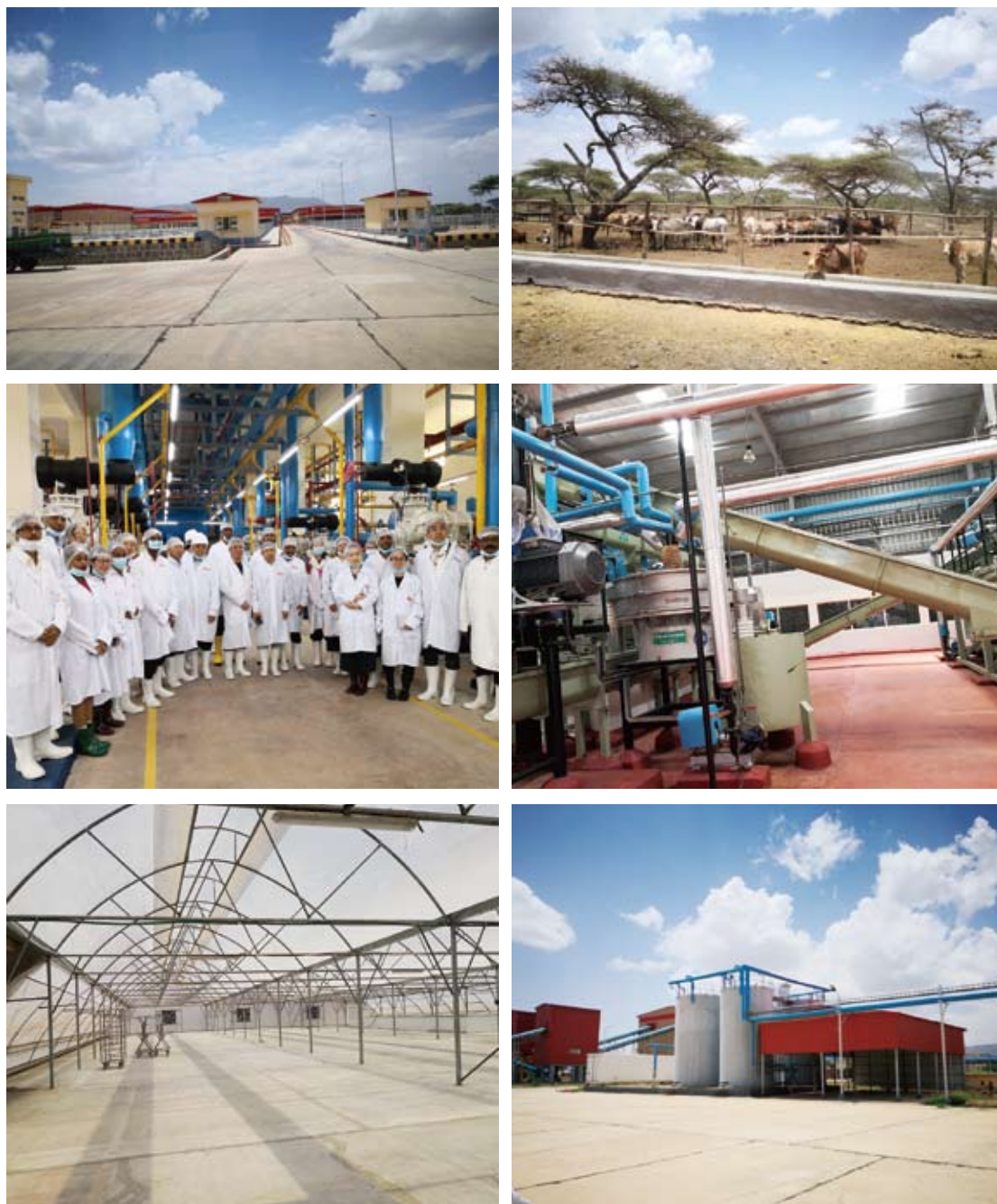


Figure 4-5 Ethiopian slaughterhouse invested by Allana Group of India

the cattle sources in Ethiopia are relatively scattered and there are few large-scale fattening farms. Unstable cattle quality will lead to unstable beef quality of downstream processing factory and restaurant, which will affect the re-purchase confidence of customers. For unstable beef quality, the market price will be devalued again based on the price of raw material level beef (Figure 4-6, Table 4-1).



Figure 4-6 Live cattle market in Ethiopia

Table 4-1 Basic information of beef slaughterhouses exported from Ethiopia

No.	Company Name	Designed Annual Capacity (tons)	Note
1	Modjo modern	5,230	10,000 Future Plans
2	Luna	5,230	
3	Organic	4,500	
4	Abyssinia	5,000	
5	Hashim	5,000	
6	Akseker	6,000	
7	Halal	5,000	
8	ELFORA D	4,100	
9	ELFORA M	5,000	
10	Al-Nujum	5,000	
11	Jigjiga	6,000	
12	Abergelle	6,000	
13	Allana FBF	90,000	
	Total	152,060	

In addition, cattle by-products have no economic value corresponding to the depth of industrial excavation. This leads to high meat prices. For example, a set of offal is about 300-400 ETB. Compared with China, the price is very low. Cattle bone can be processed into gelatin, but at present the slaughter scale is small and the collection of bovine bone is very small, which cannot support the large-scale production of gelatin processing. At the same time, other excipients for gelatin production need to be imported, which makes it impossible to fully excavate the added value of cattle bone.

4.6 Business environment

In terms of investment management, The Ethiopian Investment Commission (EIC) provides one-stop services for all foreign investors and issues investment licenses. According to the EIC,

the EIC currently has 250 staff members. For each investor, special personnel are arranged for reception and one-stop service. EIC indicated that it could offer various preferential policies such as ten years of tax exemption, a duty-free policy on all machinery imported into Ethiopia, or tax exemption for raw material import circulation, etc. But Ethiopia's tax system is more complex, needs full understanding. Especially during tax-free period, it is important to fully understand the strict compliance of the tax system and strictly comply. In addition, Ethiopia is a federal system country where the federal and local governments have their own requirements for investment. In Ethiopia, there are many nationalities different customs, which need to be well understood and respected.

With respect to the management of industrial parks, Ethiopia enacted the Industrial Park Law and established the Industrial Park Development Company. Also, special policy support is provided in the parks. After entering the park, foreign-funded enterprises shall be managed by the park development company. In export-oriented parks, land rental price is low, with the duration of 60 years. Ethiopia has formulated a series of fiscal incentives for investors in agricultural products processing, such as five-year exemptions from income tax, import tariff exemptions and export incentives.

Ethiopia is building more than a dozen parks all over the country, many of which are built by Chinese-funded enterprises. The delegation visited the Hawassa Industrial Park, which is well developed and orderly managed (Figure 4-7).



Figure 4-7 Hawassa Industrial Park completed and in use

Ethiopia is building four agricultural industrial parks (More details in Annex 2). The delegation visited the Yirgalem Comprehensive Agricultural Industrial Park (IAIP), which is well planned and has completed about 50% of the civil construction (Figure 4-8).



Figure 4-8 Yirgalem Comprehensive Agricultural Industrial Park in construction

On the land side, after the project site selection is completed, EIC apply to the Land Commission for land, or negotiate with local industrial parks for entry. Most of Ethiopia's land is state-owned, and the EIC will expropriate land according to its plan. EIC is willing to actively support the provision of land for slaughterhouses and feed cultivation. Subsidized land leasing can be provided to private enterprises to allocate sufficient land for feed cultivation.

In terms of foreign exchange, Ethiopia has limited foreign exchange and has strict foreign exchange control. There are fluctuations in the Ethiopia exchange rate. It may have a great impact on project cost.

In terms of human resources, the cost of labor is low, but there is shortage of skilled technical personnel. Ethiopia has low labor cost, which ranges from 2,000 to 4,000 Birr/month (300-600 RMB/month), and a high turnover rate of trained workers. Beef cattle value chain involves technology, such as the distribution and use of vaccines, slaughter technology application, and a lacking of relevant mature labor force. In terms of quality standards, Ethiopia has high requirements for drugs, but the certification personnel are not competent enough. It may take a long time to recruit qualified teams from abroad. In addition, foreign-funded enterprises should

pay attention to the rational disposal of labor relations.

Regarding the political environment, the change of regime, the change of political parties among regions, and the news reports of political conflicts in June and July have raised some concerns about the instability of investors.

In terms of related investment, international organizations are implementing animal husbandry related projects in Ethiopia. For example, the World Bank is currently preparing a lowland nomadic improvement project. The total investment is US\$400 million, including the construction of beef cattle value chain, breed improvement, establishment of epidemic-free areas, ear tag traceability system, animal products market, etc. The World Bank hopes that the private sector will join in the project.

International organizations such as the Gates Foundation are carrying out activities to promote the development of animal husbandry in Ethiopia. For example, in recent years, they have been promoting the improvement of the ability of preventing and controlling the epidemic of Ethiopia, as well as introduced advanced vaccine production technology and attracting investment from international vaccine manufacturers. They are promoting Ethiopia and doing their best to provide adequate and affordable foot-and-mouth disease vaccine for breeders.

The United Nations Industrial Development Organization is implementing the project of the China South-South Cooperation Assistance Fund “Upgrading Ethiopia’s Livestock Value Chain through Capacity Building”, which aims to help Ethiopia upgrade its livestock development level, promote economic and social development and jointly promote the implementation of the United Nations sustainable development agenda of 2030.

The United Nations International Trade Centre is implementing the Partnership for Investment and Growth of Africa (PIGA) project in four African countries, including Ethiopia. It is planned to take four years. By leading the four African countries in investment promotion and related industry sector officials, the entrepreneurs will have a chance to come to China to carry out frequent industrial investment promotion activities. To promote the development of agriculture and light industry in Ethiopia and other four countries, animal husbandry in Ethiopia is also one of the key areas.

Chinese-funded enterprises in Ethiopia are also optimistic about Ethiopia’s agricultural development prospects. Some large Chinese-funded enterprises in Ethiopia have undertaken a large number of construction projects in Ethiopia. They are familiar with the business environment and development advantages of Ethiopia and hope to expand to the agricultural field. For example, CGCOC, with the support of the Ethiopian government, has been promoting the construction of animal husbandry parks in Ethiopia in recent years. A great deal of communication has been made with the relevant departments of Ethiopia, and in-depth investigation of the industry has been carried out.

5 Main restrictions and cost comparison of Ethiopia beef cattle industry value chain

According to Ethiopia's GTP II plan, Ethiopia will substantially increase the production of red meat. The government hopes to transform the abundant cattle stock into foreign exchange by expanding exports, so as to promote the overall development of the country. Through desk research and field research, it was found that Ethiopia has a large cattle stock, and the prices of land and labor have obvious comparative advantages. However, the key links of beef cattle value chain are not well developed, such as weak epidemic prevention and control system, small size of cattle, lack of fattening links, and imperfect cold chain logistics system. The effective development of Ethiopia beef cattle value chain is restricted, and the quality and price of beef are lack of international competitiveness. This part mainly takes beef export as the orientation, and analyses the main advantages and development constraints.

5.1 Main restrictions

5.1.1 The overall level of agricultural development limits the development of animal husbandry

Restricted by the overall agricultural environment in Ethiopia, the development of animal husbandry is slow. The state financial investment in agriculture is insufficient, the infrastructure is weak, the accumulation rate of farmers' wealth is very low, the ability of material investment in production process is limited, irrigation is scarce, and various related inputs are scarce. At the same time, it is difficult to import related materials due to insufficient foreign exchange. These factors comprehensively restrict the production of grain, feed, and forage. At the same time, the degree of agricultural mechanization is low. Production depends on animal and human resources. Most cattle are used for agricultural production, and has not been liberated and converted into beef production.

5.1.2 Low reproductive performance limits beef quality and quantity

Low reproductive performance of beef cattle leads to low production of weaned calves. Due to inbreeding and poor nutrition and management, the reproductive performance of Ethiopian breeding cattle is very low. According to Haile et al. (2011), the age at first mating and first calving of beef cattle (e.g Boran breed) in Ethiopia are longer later than the ones in the United States of America and China, and even longer than the world average. The important reproductive performance indicators, such as calf spacing, daily average milk yield, total milk yield, calf birth weight and calf weaning weight at 6 months of age, are far from the average level of the United States, China and the world (Table 5-1).

Table 5-1 Comparison of reproductive performance of Boran beef cattle in Ethiopia with other beef breeds in major beef producing countries of the world

	Ethiopia	China	U.S.A	World Average
Age at first mating (month age)	33.4	20	16	24
Age at first birth (month age)	42.8	30	25	33
Calving interval (d)	447	395	375	430
Average milk yield per day (kg)	1.7	6.5	4.5	3.0
Full-term milk yield (kg)	507	806	810	450
Milk yield period (d)	240	124	180	150
Calf birth weight (kg)	23.3	35	36	30
Weaning weight at 6 months old (kg)	79.0	175 ~ 205	186 ~ 210	185

Data source: Data of Ethiopia are collected from Haile et al. (2011), other data are from China Animal Husbandry Statistics and FAO statistics, some of which are estimated values.

Fattening cattle weight gain is slow. Daily body weight gain and slaughter weight index of Ethiopian cattle breeds compared to beef cattle breeds widely used in the world is very low (Figure 5-1, Table 5-2).



Figure 5-1 Ethiopian Boran (left) and French Limousin (right)

Table 5-2 Comparison of average daily body weight gain and slaughter weight of beef cattle in Ethiopia and major beef producing countries of the world

	Ethiopia	China	U.S.A	Brazil	World Average
Daily gain (kg)	0.3 ~ 1.0	1.2	1.5	1.35	1.0
Slaughter weight (kg)	220 ~ 350	>500	>550	450	480
Average carcass weight (kg)	110 ~ 175	300.5	364.4	250.6	212

Note: Based on the comprehensive analysis of data from different sources.

Feed costs are high, but commercial feed demand is difficult to realize. Feed accounts for about 70% of the cost of animal husbandry, which is the key to improve the efficiency of animal husbandry. As expected, the demand for commercial feed has been rising over time. On the one hand, the price of feed raw materials has been increasing rapidly, which led to the rise of feed prices. Ethiopia has not yet achieved self-sufficiency in grain production, and keep on importing wheat from abroad. In Ethiopia, industrial-scale farming is still in the early stage of development, and smallholder farming is still the mainstay. The development of feed industry is directly related to the development speed of large-scale farming. At present, the small-scale feed industry has a larger space for development, while establishing large-scale feed industry lacks investment motivation.

5.1.3 Cattle disease restricts the expansion of the international market

Cattle disease is one of the core constraints limiting Ethiopia's international beef market. Of the 24 multiple and mass infectious diseases listed by OIE in 2019, there are 3 diseases in Ethiopian cattle. These are Foot-and-mouth disease (FMD), Anthrax and Brucellosis. Of the 13 bovine diseases listed by OIE in 2019, two are in Ethiopian herds: contagious bovine pleuropneumonia, (CBPP) and lumpy skin disease (LSD). These diseases not only affect the health and production performance of Ethiopia cattle, but also make the live cattle and beef products of Ethiopia fall short of the relevant trade requirements of OIE, which directly affects international trade with other countries. If it enters China, it will bring risks to food safety and social development.

At present, the epidemic prevention and control system of animal husbandry in Ethiopia has just begun. The relevant laws, regulations and promotion system are not perfect, and the capacity and facilities for epidemic disease prevention and control are very weak. The domestic supply of related vaccines and veterinary drugs is seriously inadequate, which is far below the demand of industrial development and fails to meet the relevant animal safety and trade standards of OIE. At present, there is still a great risk of transmission of infectious diseases in Ethiopia's, and the OIE requirement that no epidemic occurs within two years cannot be met. It is difficult to prevent and control effectively those non-epidemic areas or isolation areas because of the mixed epidemic diseases and various transmission routes. It is necessary to carry out nationwide animal epidemic prevention and control and purification. In order to cure the symptoms and the root causes, we need the assistance of the private sector to gradually promote national immunization.

5.2 Cost comparison of important links in the value chain

It can be seen from the relevant data collected that Ethiopia has comparative advantages in some value chain links, while not so in some other links. For example, the price of cattle, feed cost, land cost for forage production, labor cost and by-product price of direct cattle collection have competitive advantages compared with China. There is a lot of room for forage yield increase, but there is no international competitive advantage in fattening cattle price, export price and

transportation (Table 5-3).

Table 5-3 Comprehensive comparison of relevant costs in important links of beef cattle industry value chain

1. Feeder cattle				
Data source	Weight (kg)	Price (ETB)	Unit Price(ETB/kg)	Remark
IAIP Comprehensive Agricultural Park	260	8,000	30.77	Compared with China more competitive
Verde Beef	90 ~ 150	35,00 ~ 5,800	38.64	
Allana	160	6,400	40	
Livestock Export Association	200	10,000	50	
LUNA Slaughterhouse	210	7,770	37	
Modjo Fattening farm	260	12,500	48.08	
2. Feed cost				
Data source	Price(ETB/Cattle/Day)	Daily gain(kg/ day)	Concentrated feed(kg/ day)	
Allana	40 ~ 60	1	—	Compared with China more competitive
LUNA		0.8 ~ 1	—	
Livestock Export Association	54	1	10	
Modjo Fattening farm	25 ~ 30	—	—	
3. Land and labor costs				
Data source	Category			
	Land lease prices are very low.	—	—	Compared with China more competitive
	Low Yield of Food Crops and Forage	—	—	China has high yield varieties and planting techniques
Livestock Export Association	Temporary workers 100ETB/day	—	—	Compared with China more competitive
4. Fattening cattle				
Data source	Weight (kg)	Price (ETB)	Unit Price (ETB/kg)	
IAIP Comprehensive Agricultural Park	350	15,000	42.86	No Advantage compared to Chinese Market
Verde Beef	210 ~ 240	—	—	
Allana	270 ~ 280	—	—	
Addis Live Cattle Market	500/250~300	One is 25,000~30,000, the other is above 17,000	One is 50~60, the other is above 57	
Livestock Export Association	250 ~ 350	18,900	54	
Al-Nujum Slaughterhouse	220 ~ 300	—	—	
LUNA	300	—	—	
Modjo Fattening farm	500 ~ 600	30,000	50 ~ 60	

(Continued)

Note	Over 500 kg of cattle are sold for special activities Hybrid cattle (crossbred of exotic and indigenous) are sold at higher price mainly due to higher body weight (>500 kg). E.g. A 3-year-old cattle with about 500 kg weight was sold at 60,000 ETB.			
5. Beef price				
Data source	Exit ETB/kg	local ETB/kg		No Advantage in Chinese Market
Verde Beef	120	—		
Addis Meat Shop	—	170 ~ 240		
Ethiopia Livestock Export Association	108	270		
6. Pressing percentage and meat yield				
Data source	Pressing percentage (%)	Meat yield (%)		
IAIP Comprehensive Agricultural Park	44.29	34.29		
Allana	50	40		
Al-Nujum Slaughterhouse	55	41.25		
Ethiopia Livestock Export Association	50	—		
7. By-product				
Category	Price	Note		
Offal	14 USD per piece	Excluding skin		Competitive
Skin	10 USD per sheet	300kg live weight		Competitive
8. Transport				
Freight for refrigerated containers	Two-way pricing of 9,000 USD (Addis-Djibouti)	If enough freight volume is available, one-way freight can also be agreed upon.		Not Competitive

Data source: Based on the organized data collected during the visit of the delegation; the competitiveness comparison is jointly determined by the expert group.

5.3 Analysis of economic ratio model

Based on the data shown in the table above, which was collected from the research, the following key assumptions (Table 5-4) are set:

- (1) The unit price of live cattle weighing about 160 kg is purchased from farmers at 42.8 ETH/kg.
- (2) The selling price of fattened cattle weighing about 280 kg is 72.1 ETB/kg (2.5 USD/kg).
- (3) The slaughter rate was 50% and the meat yield was 75%;
- (4) The price of beef is 120 ETB/kg (4.1 USD/kg);
- (5) The selling price of by-products is 14 USD per pair, and that of skin is 10 USD per piece.

Table 5-4 Economic analysis key assumptions

Item	Weight (kg)	Unit Selling Price (ETB/kg)	TOTAL Selling Price (ETB/kg)	Unit Selling Price (USD/kg)	TOTAL Selling Price (USD/kg)
Pre-fattening weight	160	42.8	6,848	1.5	236
Weight after fattening	280	72.1	20,188	2.5	696
Carcass weight (SLAUGHTER RATE 50%)	140	86.4	12,096	3.0	417
Net meat weight (meat yield 75%)	105	120	12,600	4.1	434
Bone weight	35	5.4	189	0.2	7
By-product weight (excl. skin)	110	3.8	418	0.1	14
Skin weight(one skin)		297	297	10	10

Note: based on the current exchange rate of 1:29.

According to the above assumptions, the gross profit margin of the fattening farm can reach 43%, but the slaughterhouse is in serious loss, with a gross profit margin of negative 51.3%, a loss of 224 USD per head of cattle (see table 5-5 for details). At this time, the transaction price of fattened cattle is about 2.5 USD/kg, while the average export price of Australian live cattle is 2.0-2.3 USD/kg, and the quality of Australian live cattle is much higher than Ethiopian live cattle. Without gaining quality advantage, the cost was higher than that of Australian live cattle, which led to a decline in the economic ratio of beef production. It is difficult for slaughters to gain competitive advantage in the international market. Especially in the raw material level market, the high price of Ethiopian live cattle leads to huge losses of slaughterhouses.

Table 5-5 Current economic ratio of fattening farms and slaughterhouses in Ethiopia

Category	Amount	
	ETB/head	ETB/head
Fattening farm economic ratio		
Cost	11,648	402
Shelf cattle cost	6,848	236
Fattening cost (30 ETB/day, 120 day)	4,800	166
Revenue	20,188	696
Gross profit	8,540	294
Gross profit margin	42.3%	
Slaughterhouse economic ratio		
Cost	20,431	705
Live cattle cost	20,188	696
Slaughtering and packing	243	8
Revenue	13,504	466
Sales of meat	12,600	434

(Continued)

Category	Amount	
	ETB/head	ETB/head
Sales of bones	189	7
By-products	715	25
Gross profit	-6,927	-239
Gross profit margin	-51.3%	

According to the hypothesis of the analysis model, Ethiopian beef cattle production needs to meet the following indicators to achieve profitability:

(1) Under the condition that fattening farms and slaughterhouses operate independently: ① The daily cost of fattening cattle needs to be reduced from 40 to 30 ETB. ② The fattening farm reduce the selling price of live cattle to 2 USD/kg, which was consistent with the international price of live cattle, and transferred the profit to the slaughterhouse. In this case, the gross profit margin of the fattening farm could still reach 35.7%. ③ Develop by-product value, especially cattle skin, so that the comprehensive income of by-product can reach 128 USD per cattle. With above methods taken, slaughterhouses can prevent loss, as shown in table 5-6.

Table 5-6 Economic ratio for Ethiopian beef to be profitable

(fattening farms and slaughterhouses operate independently)

Category	Amount	
	ETB/head	USD/head
Fattening farm economic ratio		
Cost	10,448	360
Shelf cattle cost	6,848	236
Fattening cost (30 ETB/day, 120 day)	3,600	124
Revenue	16,240	560
Gross profit	5,792	200
Gross profit margin	35.7%	
Slaughterhouse economic ratio		
Cost	16,483	568
Live cattle cost	16,240	560
Slaughtering and packing	243	8
Revenue	16,507	569
Sales of meat	12,600	434
Sales of bones	189	7
By-products	3,718	128
Gross profit	24	1
Gross profit margin	0.1%	

(2) Under the condition that fattening farms and slaughterhouses are in integrated operation model, the price of live cattle is the price of fattening cost plus the price of slaughterhouse packaging, which greatly reduces the cost of slaughterhouse enterprises, and the gross profit rate of slaughterhouse can reach 11.9%, as shown in table 18. In this case, combined with other measures, the fattening cost can be reduced to 30 ETB per day, and the by-product income can be increased to US \$128 / by-product, then the gross profit margin of the fattening farm can reach 35.2% (Table 5-7).

Table 5-7 Economic ratio for Ethiopian beef to be profitable

(fattening farms and slaughterhouses in Integrated Operation Model)

Category	Amount	
	ETB/head	USD/head
Fattening farm economic ratio		
Cost	11,891	410
Shelf cattle cost	6,848	236
Fattening cost (40 ETB/day, 120 day)	4,800	166
Slaughtering and packing	243	8
Revenue	13,504	466
Sales of meat	12,600	434
Sales of bones	189	7
By-products	715	25
Gross profit	1,613	56
Gross profit margin	11.9%	

It should be noted that the above calculations are based on assumptions and do not include other costs such as epidemic prevention, road transportation, storage, etc., that are not included in the assumptions. The calculations are for reference only.

5.4 Competitiveness evaluation of Ethiopia's beef export

5.4.1 Export to China market

Ethiopia's export price at a present is 4.5 USD/kg. South America and India are currently the major competitors with Ethiopia. The demand for beef in the Chinese market is diverse. At present, more than 80% of China's beef demand industry is also material level beef. South America is China's largest supplier. As far as the comparative relations among various countries are concerned, Ethiopia has an increasing potential for growth, but the current conditions are poor. For entering the international market, it is at a competitive disadvantage (Table 5-8).

Table 5-8 China beef international market cooperation evaluation

Analysis Points	North America	Australia	South America	Ethiopia
Political environment	excellent	excellent	general	general
Cattle quality	excellent	excellent	general	low
Beef export price	high	middle	low	low
Production capacity	high	middle	high	low
Export volume	high	high	high	low
Local consumption	middle	low	high	low
Asset premium	high	middle	low	low
Operational difficulty	low	middle	high	high
M&A opportunities	less	seldom	many	many
Labour forces	strong	weak	strong	strong
Relations with China	tension	common	stable	stable

Ethiopia does not have much advantage in price. Meanwhile, the low quality of cattle makes it difficult for Ethiopia to compete with South American countries for market share in China. China is Uruguay's largest buyer, with an average price of \$3.49 per kg. Brazil is also China's largest beef supplier. Boneless beef is exported to China at a price of \$4.6 per kg. It can be understood that the acceptable price of raw beef in China is between \$3.5 and \$4.6.

In terms of transportation, high transportation costs also restrict Ethiopia's beef competitive advantage. At present, Ethiopia's only sea port is Djibouti. The cost of round-trip transportation is 9,000 USD/FCL, \$0.36/kg. High logistics costs could bring the CIF price of beef in Ethiopia to \$4.9-5.0. How to reduce Ethiopia's export costs and logistics costs is also a key problem to be solved. At present, according to the survey, stable export volume can reduce logistics costs by about 50%. There is still a logistics cost of \$0.18 /kg which needs to reduce the profit margins of slaughterhouses and exporters.

According to the research and analysis, the delegation predicts that the price of beef that Ethiopia can eventually export to China is 4.8USD/kg. At present, there are conditions for such capacity. However, it is difficult to achieve success and profitability in the Chinese market without competitive advantage in quality and price.

5.4.2 Excess to Middle East

From 2015 to 2019, beef imports into Middle East were relatively stable and did not show great growth, indicating that the market was relatively saturated and it was difficult to obtain an incremental market.

North America and South America are the main suppliers of the Middle East market. As of July 2019, beef imports supplied about 1 million tons, including 110,000 tons from the United States, 340,000 tons from South America, 200,000 tons from India and 350,000 tons from other

countries. This shows that buyers throughout the Middle East are still concentrated in low-end beef. If Ethiopia enters the Middle East market, it needs to face strong competition from the main suppliers of low-end beef in the world. In the absence of an incremental market, it needs to have a cost advantage. If Ethiopia improves productivity and reduces the cost of cattle production and make the prices competitive compared with South America, the country will have the opportunity to take over the market share from South America in the Middle East market.

6 Cooperation proposal

6.1 Cooperative objectives

The two sides will work together to promote healthy and competitive beef cattle industry value chain in Ethiopia, reduce the risk of disease, control production costs, improve beef quality, give full play to comparative advantages, expand export earnings, promote smallholder farmers' income, and promote the sustainable development of animal husbandry and large-scale agriculture. Development goals can be achieved in three ways.

6.2 Cooperation basis

(1) Maintain the stability of the macro business environment and constantly optimize it. It is necessary to maintain political stability, policy coherence, long-term and stable policy commitments for investment enterprises such as land lease and preferential policies, to maintain comparative advantages and stability in making land available, tax categories and tax rates, and human capital for a certain period. Foreign-funded enterprises are regarded equally as local enterprises in bidding.

(2) Introduce relevant public and international resources to support beef cattle value chain. The introduction of public and international resources such as the World Bank, the Gates Foundation, the United Nations Industrial Development Organization, the African Green Alliance and etc. is important to effectively supports the value chain cooperation.

(3) Design proper risk aversion measures. There has always been a shortage of foreign currency in Ethiopia. Especially in the context of the rise in US dollar interest rates and the fall in commodity prices, the foreign exchange market in Ethiopia will be under severe pressure. If Ethiopia's local currency devalue by a large margin, the import of raw materials, production and operation, and return of earnings of foreign enterprises will be greatly impacted. It will directly manifest itself in increasing the exchange loss in financial statements, directly eroding the operating profits of enterprises, and making the sustainable operation of enterprises in a dilemma.

6.3 Cooperation paths

6.3.1 Promoting knowledge cooperation and capacity building in an all-round way

Promoting all-round knowledge sharing, experience exchange and technology exchange on beef cattle industry value chain is important to develop the sector. This may start with knowledge sharing and technology exchange in the area of epidemic disease prevention and control system. China's experience in epidemic disease control epidemic prevention and

control system, inspection and quarantine experience could be shared. Secondly, knowledge sharing in the area of beef cattle value chain policy system. China's beef cattle industry value chain 40 years ago was in a similar situation to Ethiopia's. China can share the relevant industrial policy evolution, mechanism structure, industrial development models, as well as the agricultural development experience of how to promote the transformation of traditional agriculture into modern agriculture and how to develop agricultural machinery to replace livestock power. Thirdly, knowledge sharing and technology exchange in the area of breed breeding, cattle and fattening. Focusing on the key areas of beef cattle breeding, utilization of genetic materials, introduction of raw materials for premixed feed, vaccine production and import of raw materials, joint research and development, technical training and scientific research achievements are carried out in the key links of beef cattle breeding, epidemic prevention and control, feed feeding, fencing fattening, slaughtering and processing, marketing, and focus on the display of advanced technology and excellent varieties, and share with the stakeholders of Ethiopian beef cattle industry value chain the advanced technology, experience and achievements. The fourth is to share the supply and demand information of Chinese beef market. Emphasis is on sharing and exchanging experiences of beef slaughter segmentation standards, e-commerce platform and a variety of market mechanisms to promote the rapid growth of beef consumption market.

Explore various forms of capacity building to achieve knowledge sharing. Provide capacity-building platform for policy makers, industry associations, scientific researchers, private sector and other relevant interest groups in Ethiopia through various forms. Promote China's development assistance resources, attract resources from international organizations, engage private sector with investment intention, co-cultivate beef cattle industry value chain talents, and promote the establishment of new technologies, new models and new industry momentum in the beef cattle industry value chain. We suggest holding beef cattle industry value chain technology training courses and academic seminars alternately in China and Ethiopia; exchanging foreign students under the framework of the two governments and sending over relevant technical assistance experts; and holding industrial technology exchanges and technical inspection activities for students, scholars and young entrepreneurs on a regular basis. To provide capacity-building platform for policy makers, industry associations, scientific researchers, the private sector and other relevant stakeholders in Ethiopia in various forms.

6.3.2 Vaccine first followed by veterinary medicine

It is suggested that Ethiopia should attach great importance to and address the issue of epidemic prevention and control, and make effort to achieve the two-year no-epidemic requirement of OIE as soon as possible, in order to obtain the recognition of China and other international markets.

Share and learn the epidemic control experience of China, and encourage foreign investment in vaccines production and epidemic prevention. Attract foreign investment to develop localized

vaccine production, break out of the existing adverse cycle, reduce dependence on imported foreign exchange, and promote national immunization through the phased progress of the epidemic. We suggest that the retail of veterinary drugs and vaccines be opened to foreign investment as well, promoting cooperation between foreign enterprises and local management departments to strengthen the construction of immunization network, so as to grasp the regular cycle of epidemic diseases.

China's large vaccine companies, with rich experience and technology in epidemic prevention and control, have endogenous motivation for overseas cooperation. They can cooperate closely with Gates Foundation and Ethiopia Government to jointly develop the Private-Public-Philanthropic-Partnership (PPPP) model. At the same time, we suggested that relevant veterinary drug technologies and products in China are introduced and, using the same promotion system, play an active role in prevention and control together with vaccines, supporting Ethiopia to realize the two-year no-epidemic requirement of OIE as soon as possible, and lay a solid foundation for expanding the broader international market.

In the industrial cooperation of vaccines and veterinary drugs, it is also suggested to closely integrate the existing public investment of Ethiopia and relevant resources of international organizations to achieve value chain cooperation and sustainable development in the field of subdivided.

6.3.3 Development of integrated model of fattening and slaughtering

The goal of cooperative management is large scale beef cattle production and cost reduction. Ethiopia's abundant cattle resources and comparative advantage of production costs have a strong attraction for such enterprises. It is suggested that we promote such enterprises to carry out industrial cooperation in Ethiopia and try to build demonstration projects of "beef cattle production, and value addition" whole industry chain. An integrated development model with adequate feed resource development and silage base, fattening base and slaughter factory can be built in areas with high cattle production and supply, and manage production cost effectively. It is suggested to organically integrate with the existing production base of Ethiopia, and cooperate with relevant international organizations such as the World Bank in terms of basic cattle improvement and farmer cattle production to achieve value chain cooperation. The government is suggested to give relevant Park policy support to attract enterprises to develop in Ethiopia. In terms of markets, based on the current basis, it is suggested that the Middle East market should be the main market in the short term, and broader international market should be targeted in the medium and long term.

6.4 Prospects for long-term cooperation

The major constraints for the development of Ethiopia beef cattle value chain lie in the prevention

and control of epidemic diseases and costs control. After long-term efforts to achieve effective epidemic prevention and control and to meet the OIE-related epidemic prevention and control requirements, beef cattle industry in Ethiopia will usher in rapid development. In the long period of strengthening epidemic prevention and control in Ethiopia, Ethiopia can introduce and improve cattle breeds that are more suitable for international beef market through knowledge cooperation and capacity building. Through optimization of value chain and cost management, fattening links are improved, live cattle costs are reduced, by-products values are increased and logistics links are optimized. As a result, beef prices have become more competitive in the market. At that time, the quality and quantity of beef in Ethiopia will have a qualitative leap. China and Ethiopia will usher in broader cooperation in beef cattle industry value chain.

Part II

Research on China-Ethiopia Sesame Industry Value Chain Cooperation



Sesame is the second largest export product of Ethiopia and plays an important role in Ethiopia's national economy. Ethiopian sesame has an important position in the global market and it is a major producer and exporter of sesame in the world. The Ethiopian government regards the development of sesame as a top priority, and has formulated the Sesame Sector Development Strategy, with an aim to substantially increase export revenue by improving productivity, quality and value addition. The overall vision is to see Ethiopia being the leading sesame exporter with at least 25% of the global market share and tripling its foreign currency earnings by 2020.

For a long time, Ethiopia and China have maintained sesame trade. Ethiopia and China have a sound foundation and broad prospect for sesame cooperation. China is a major consumer and importer of sesame. Ethiopia used to be China's biggest source of sesame import for a long time, while China used to be Ethiopia's largest sesame export country. In 2016, the export volume of sesame from Ethiopia to China reached 304,000 tons, the highest record in history. However, there has been a decline in recent years. In 2019, the sesame exported by Ethiopia to China was only at 112,000 tons. China's sesame import demand has been growing, and China's sesame R&D and production technology are also in the forefront of the world. The two countries share great potential to expand cooperation.

7 Literature review on Ethiopia's sesame value chain

This chapter mainly goes through the basic status of Ethiopia production and export, and reviews the bottleneck and intervention measures of Ethiopia's sesame value chain based on the data provided by the Ethiopian Agricultural Transformation Agency (ATA).

7.1 Sesame production

Ethiopia is one of the main sesame cultivation regions in the world and plays an important role in the global sesame production. The world's sesame cultivation is distributed from tropical to temperate regions, with an altitude of 500-1,300 meters, mainly in Asia, Africa and Latin America (FAOSTAT, 2020). Among them, Ethiopia, Sudan, Togo, Tanzania, Nigeria and some other countries are the main sesame producing and exporting countries in Africa. These countries have high sesame yields and play an important role in the global sesame market.

In recent years, Ethiopia's sesame yield has increased rapidly overall with some fluctuation. Ethiopia has been one of the top ten countries in sesame yield since 2002, with a rapid growth from 40 thousand tons in 2002 to a first peak of 330 thousand tons in 2010, ranking the fourth in the world; after that, it fluctuated while it also maintained relative and general stability. In 2018, it reached 300 tons, accounting for 5% of the global yield. Since 2015, Ethiopia has been the seventh largest sesame producers in the world, with the top six being Sudan, Myanmar, India, Nigeria, Tanzania and China (FAOSTAT, 2020) (Figure 7-1).

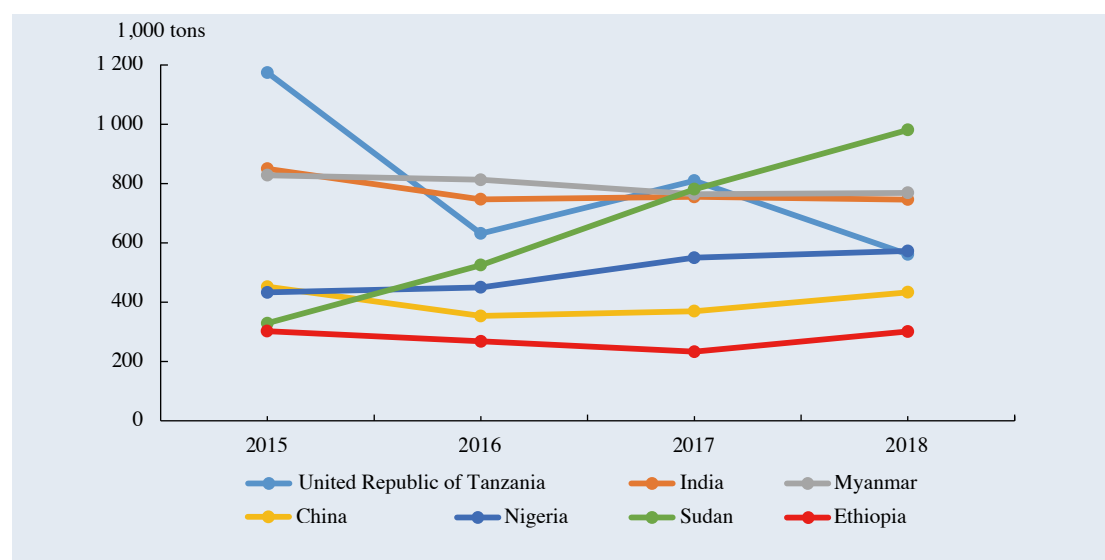


Figure 7-1 Comparison of sesame total yield among top 7 countries in sesame total yield (2015-2018)

Data source: FAOSTAT, query time: May 2020.

Ethiopia's sesame unit yield is above world average, but still lagging behind the top level. The production trend of sesame in Ethiopia is fluctuating from year to year due to different biotic and abiotic stresses. Ethiopia's mean sesame yield is 0.7 tons/ha (Figure 7-2), which is relatively low compared with a mean yield of 1 ton/ha in sub-Saharan Africa and 1.3 ton/ha in Egypt (Ethiopian Central Statistics Authority, 2020; FAOSTAT, 2020). In 2018, Ethiopia's sesame unit yield was 725.8 kg/ha, while the world average was 512 kg/ha. Ethiopia's sesame unit yield ranks behind China and Nigeria, while higher than Sudan, Myanmar, India, Tanzania and some other countries. The low productivity is attributable to a lack of improved and high-yielding varieties and traditional production technologies, among other constraints (Figure 7-3). Landrace varieties are the main sources of seed for cultivating the crop in Ethiopia (Teklu et al., 2021).

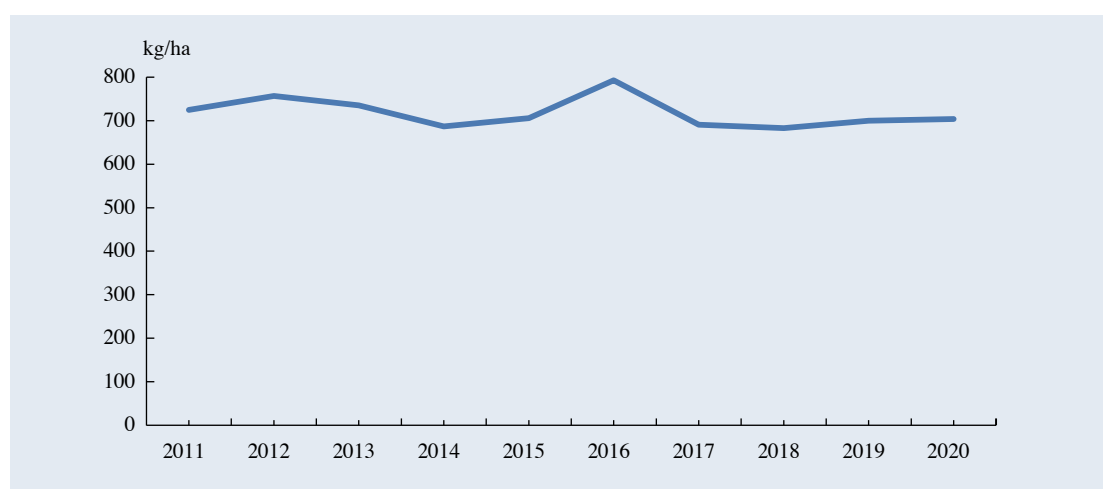


Figure 7-2 Sesame unit yield in Ethiopia (2011-2020)

Data source: Ethiopian Central Statistics Authority (CSA, 2011/12-2020/21).

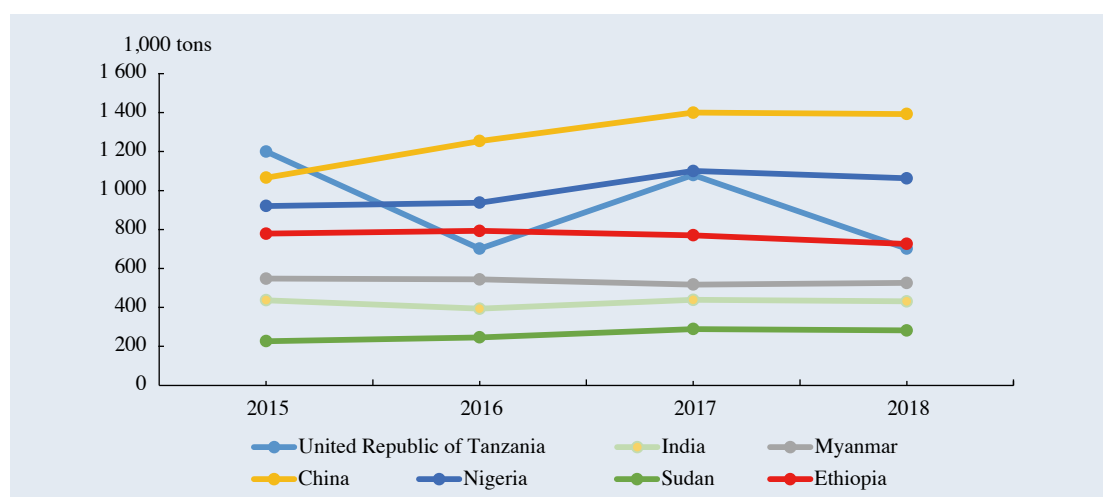


Figure 7-3 Comparison of sesame unit yield among top 7 countries in sesame total yield (2015-2018)

Data source: FAOSTAT, query time: May 2020.

Ethiopia mainly depends on the increase of cultivated area to achieve sesame total yield increase, and Ethiopia's cultivated area is relatively small among major sesame cultivation countries. In 2018, the cultivated area of sesame in Ethiopia was 300 thousand hectares, accounting for 3% of the global sesame area. The change of area is consistent with the change of total yield, indicating that the change of total yield is mainly caused by the increase and decrease of cultivated area (Figure 7-4). Among the top seven countries, the cultivated area of Ethiopia is less than that of other five countries except China (Figure 7-5). In recent years, some African countries, such as Sudan and Nigeria, have greatly increased sesame total yield by rapidly expanding their cultivated area. For example, Sudan's total yield has risen rapidly in recent years, with its sesame yield reaching 980 thousand tons in 2018, ranking the first in the world, mainly due to the rapid growth of its cultivated area which reached 3,480 thousand hectares in 2018, nearly 4 times that in 2015.

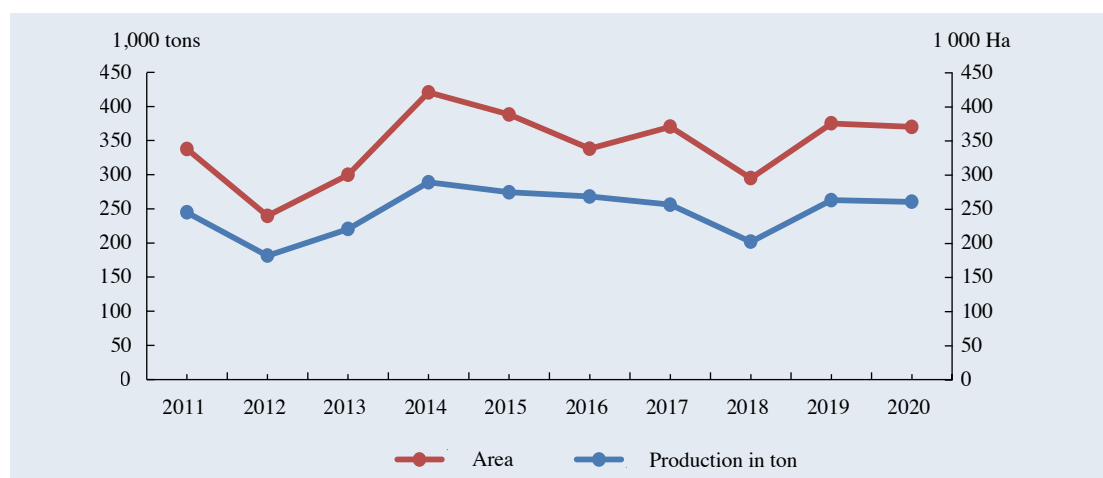


Figure 7-4 Sesame cultivated area and yield in Ethiopia (2011-2020)

Data source: FAOSTAT, query time: May 2020.

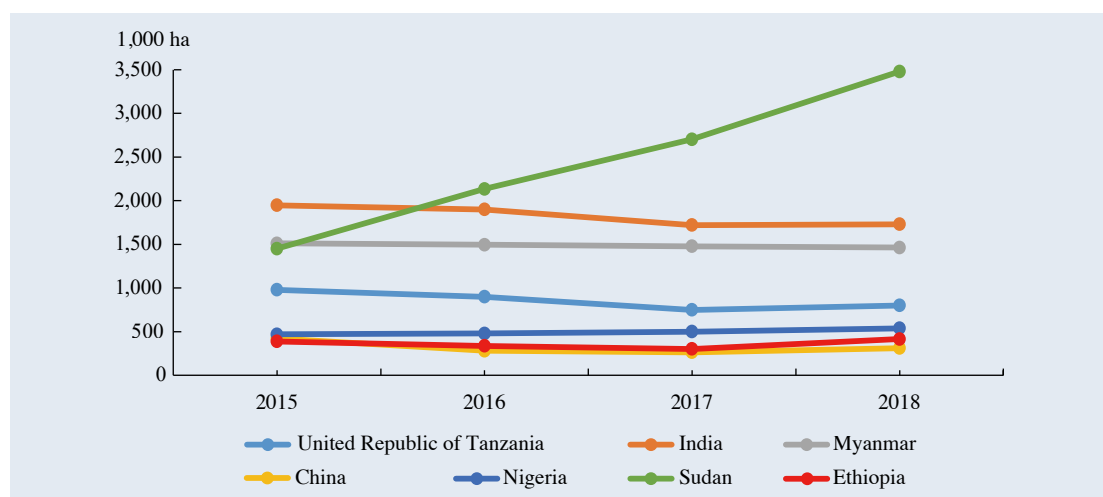


Figure 7-5 Comparison of sesame cultivated areas among top 7 countries in sesame total yield (2015-2018)

Data source: FAOSTAT, query time: May 2020.

Sesame in Ethiopia is mainly planted by smallholder farmers and medium/large commercial farms, and the cultivated areas are relatively concentrated. There were about 543 thousand smallholder farmers engaged in sesame production in 2019 (CSA forecast, 2019/20). The lowlands of Ethiopia the Tigray and Amhara regions bordering to Sudan are the major sesame cultivated areas, which are contributing greater than 80% to the national production. According to the Central Statistical Agency reported on area and production of sesame by small farmers and medium/large commercial farms (CSA 2019/20), the Tigray had the largest share of sesame production (43.65%), followed by Amhara region (41.92%). The share of Benishangul-Gumuz and Oromia regions was 7.30 and 6.29, respectively. In recent years, commercial farms in Afar, SNNP, Gambela and Somali regions and smallholder farmers in SNNP region have started producing sesame in significant acreages. Based on temperature and rainfall requirements of sesame, there are high potential areas in Afar, SNNP and Somali regions where sesame production can be expanded to.

7.2 Sesame export

Sesame is the second most valuable export crop after coffee (*Coffea arabica* L.) and a major contributor to Ethiopia's gross domestic product (Gebremedhn et al, 2019). Here is below the export value of sesame in USD from 2011/12-2016/17 (Figure 7-6).

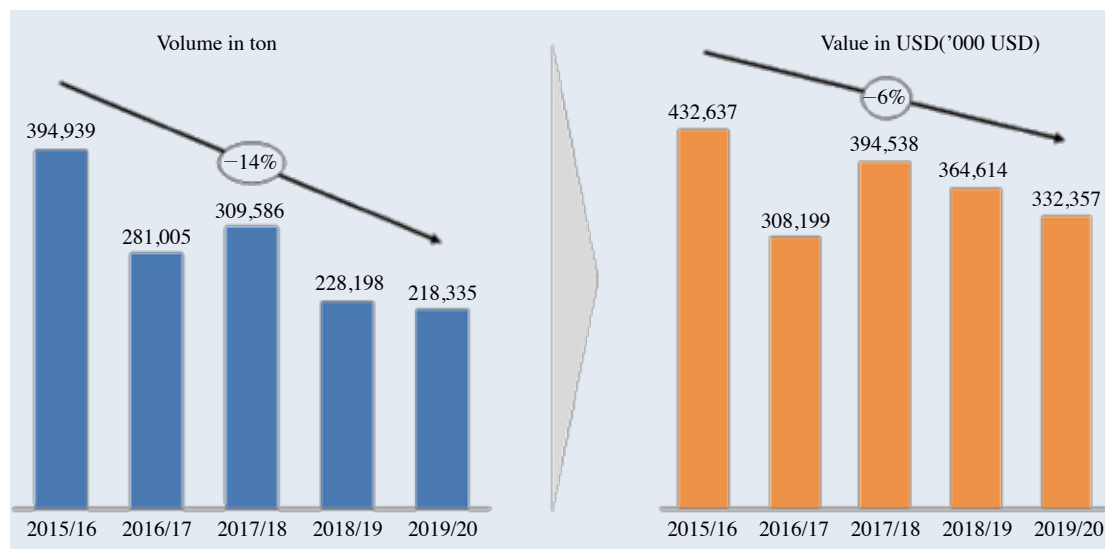


Figure 7-6 Sesame export volume and value of in USD in Ethiopia (2015-2019)

Data source: Ethiopian Revenue and Customs Authority (ERCA, 2015/16-2019/20).

Ethiopia is an important sesame exporter in the global market, but its market share has declined in recent years. Ethiopians rarely consume sesame as their food, and the amount of sesame used for local processing is very small. Sesame, as Ethiopia's main cash crop, is mostly used for export. About 97% of export is raw sesame while about 3% is processed into hulled

sesame or tahini. Ethiopia's export volume in 2019 was about 250 thousand tons, accounting for around 17% of the total export volume globally, which is behind Sudan and Nigeria, and tied with India for the third place (Table 7-1).

Table 7-1 Market shares of major sesame exporting countries (2013-2019)

County		2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019
Sudan	Export volume	11	19	17	29	39	50
	Share	8.5%	13.0%	10.4%	19.9%	24.7%	33.8%
Nigeria	Export volume	18	22	27	28	27	28
	Share	14.5%	15.0%	16.7%	18.8%	17.0%	18.9%
India	Export volume	30	33	32	29	28	25
	Share	23.9%	22.6%	19.8%	19.9%	17.8%	16.9%
Ethiopia	Export volume	29	28	42	29	32	25
	Share	23.2%	19.4%	26.0%	19.7%	20.5%	16.9%
West Africa/ Togo	Export volume	13	19	20	13	12	20
	Share	10.1%	12.6%	12.3%	8.6%	7.7%	13.2%
Tanzania	Export volume	12	13	14	10	8	14
	Share	9.2%	9.1%	8.6%	6.5%	4.8%	9.5%
Mozambique	Export volume	5	5	5	5	7	7
	Share	4.3%	3.5%	2.9%	3.2%	4.2%	4.4%
China	Export volume	4	3	2	4	3	5
	Share	3.0%	2.2%	1.5%	2.4%	2.1%	3.0%
Uganda	Export volume	4	4	3	2	2	3
	Share	3.2%	2.7%	1.8%	1.1%	1.3%	1.7%

Data source: <https://www.fao.com.cn/>.

Ethiopia's sesame exports are mainly primary products and the export markets are concentrated. About 97% of the sesame in Ethiopia is exported in raw form, less than 5% is processed into hulled sesame and sesame paste. About 60% sesame export destinations is China, 30% are Israel, Turkey, Jordan, Korea, Greece. The main market destinations for the processed sesame are USA, Netherlands, Israel, Japan, UAE, and Germany. In recent years, the value and the quantity in the export share in the main market such as China is in the down trend (Table 7-2).

Ethiopia's sesame export is well-organized. Sesame is mainly exported through ECX. It reaches the ECX from producers through five primary channels: ① farmers → Cooperatives → ECX; ② farmers → traders in the primary transaction centers → ECX; ③ big farmers → ECX; ④ big farmers → export; ⑤ primary cooperatives → export.

7.3 The role of key stakeholders

Sesame, as an important export product for foreign exchange of Ethiopia, has been widely supported by various departments, mainly including the following organizations and groups.

(1) Government departments, organizations and individual that are directly related

① The Ministry of Agriculture (MoA) is responsible for developing and coordinating the implementation of the overall national agricultural development policies and strategies, with input and support from the regions and other stakeholders. The ministry is also responsible for developing extension packages for newly developed technologies and disseminating those through its extensive extension networks.

② The Regional Bureaus of Agriculture (RBoAs) are responsible for coordinating and leading agricultural development in their respective regions. RBoAs develop extension packages and provide support to zonal and woreda offices of agriculture in delivering extension services. They also facilitate coordination and alignment across development partners to ensure coordinated agricultural development services are delivered at the zonal and woreda level.

③ The Ethiopian Institute of Agricultural Research (EIAR) and the Regional Agricultural Research Institutes (RARIs) have the mandate to generate, adapt and promote agricultural technologies that are required to enhance agricultural productivity. These institutes play key roles in the development, release and promotion of improved technologies (including improved varieties, recommended agronomic practices and farm implements) and up-to-date information. They are also responsible for multiplication and supply of early generation seed (breeder and pre basic seeds). In addition, EIAR is responsible for the coordination of nationwide research, while the RARIs have the responsibility to conduct targeted research and develop mainly region-specific technologies and recommendations. EIAR manages several federal research centers, each mandated to work on a specialized set of agricultural research subjects. The national sesame research is coordinated from Humera agricultural research center (under TARI). Other research centers involved in sesame research include, Werer, Gonder, Pawe, Bako, Gambela and Jigjiga and higher learning institutes including Mekelle, Axum, semera, Gondar, Jigjiga and wollega universities amongst others. In addition to the crop research centers, there are agricultural mechanization research centers such as Asella, Bako, Melkasa, and Bahirdar which focus on the production of agricultural machinery prototypes and testing imported machineries.

④ The Ethiopian Agricultural Transformation Agency (ATA) is an initiative by the Government of Ethiopia (GoE) with the primary aim of promoting agricultural sector transformation by supporting existing structures of government, private-sector and other non-governmental partners to address systemic bottlenecks and deliver on a priority national agenda to achieve growth and food security. ATA's overall mandate is to address systemic bottlenecks in the agricultural

sector by supporting and enhancing the capability of the MoA and other public, private, and non-governmental implementing partners, with the ultimate objective of improving the livelihoods of sesame farmers. The ATA, with its partners, is currently working in systemic bottlenecks identification and formulating solutions; implementation support to provide project management, technical assistance, and knowledge sharing; capacity building to strengthen key public, private, and civil society partners to ensure sustainability of interventions; and coordination to enhance linkages and coordination among stakeholders in high priority areas to reach agreed-upon milestones and objectives.

⑤ **Ministry of Finance and Economic Development (MoFED)** formulates development policies, plan and budget; mobilize and administer external resources; and institutes efficient and effective accountable public finance and property administration and controlling system. It has a major stake in sesame production through its influence in policy making and resource allocations.

⑥ **The Federal Cooperative Agency (FCA)** develops and enforces federal cooperative regulations. It works towards creating enabling environment for various types of cooperatives in the country. It plays key role in the sesame sector through its influence in providing the enabling environment for the development of effective and competitive cooperatives and unions involved in the sesame sector.

⑦ **Higher Learning Institutions (HLIs).** There are over 30 universities and colleges currently in operation in the country. Many of the older ones such as Haromaya University, Mekele University, Hawassa University, Bahir Dar University, Ambo University and Jimma University have agricultural colleges engaged in agricultural research and extension, mainly addressing priority constraints in the regions where they are located.

⑧ **Institute of Biodiversity Conservation (IBC)** is a federal government institute with mandates to ensure: conservation of biodiversity, sustainable utilization of resources, and access to and sharing of benefits of biological resources. In the case of crops, IBC maintains a gene bank for the preservation of indigenous land races. IBC is a close ally of the research system in the identification, development and maintenance of improved varieties. It is also a key partner in the identification and management of risks associated with widespread technology adoption.

⑨ **Seed Enterprises.** The Ethiopian Seed Enterprise (ESE) and Regional Seed Enterprises (RSEs) in Amhara and Tigray regions a representative of ESE are playing a role in seed production and distribution. In general, seed enterprises exercise the dual mandate of implementing the government's target of producing sufficient quantities of improved seed for key crops including oil seeds like sesame, while functioning as independent profit-making businesses.

⑩ **Ethiopian Seed Growers and Processors Association** strives to strengthen the seed system in the country by playing a coordination role in the formal seed sector (Private, public...), and

plays advocacy roles in policy formulation (seed law) based on ISTA (International Seed Testing Agency) models.

⑪ **Agricultural Input Supply Enterprise (AISE)** has the primary responsibility of importing and distributing critical agricultural inputs including fertilizers.

⑫ **National and Regional Soil Testing Laboratories** support the extension service through undertaking various soil analysis works. They also provide service to the private sector. There are 18 laboratories including the National Soil Testing Laboratory located in Addis Ababa, and the remaining 17 spreads in 7 regions.

⑬ **Farmers, commercial and state farms.** Both small and medium/large sesame farmers, are the ultimate owners of and beneficiaries from this sector strategy. The commercial and state farms play a role in realizing the overall vision for the sesame sector, these farms would have significant contributions. These farms also play major roles in expanding mechanized sesame production.

⑭ **Primary Cooperatives (PC) and Cooperative Unions (CU).** Agricultural cooperatives have an important role to play in addressing the needs of smallholder farmers, including providing inputs and output marketing services.

⑮ **The Ethiopian Commodity Exchange (ECX)** is an organized marketplace, where buyers and sellers come together to trade-assured of quality, quantity, payment, and delivery. ECX now trades mostly coffee, sesame, and pulses.

⑯ **Private sector.** the sesame value chain can benefit from private sector investment and participation. The sector can play lead role in the production and distribution agricultural inputs; in the import, export, production, and distribution of post-harvest machinery; mechanization service delivery, and agro-processing and marketing. Such participation can be achieved through a variety of business models, including Public-Private Partnerships (PPP).

(2) Other relevant ministries

① **The Ministry of Trade (MoT)** is a key stakeholder in the domestic and export marketing of sesame. As the country is striving to expand sesame export to conventional and higher market, the ministry plays key role in developing and implementing policy interventions that facilitate the production and marketing of sesame.

② **The Ministry of Industry (Mol)** has a mandate to support the development of agro-processing industries, through providing enabling policy environment.

③ **The Ministry of Foreign Affairs (MoFA)** contributes towards the promotion of the country's agricultural potential in international platforms to attract more Foreign Direct Investment (FDI).

④ The Ministry of Women, Children and Youth Affairs (MoWCY) has a mandate to promote gender mainstreaming to improve women's participation in overall national development. It can play key roles in addressing gender issues in the agriculture sector, including in sesame production and marketing.

(3) National and regional projects working on sesame

① **AGP (Agricultural Growth Program):** The Agriculture Growth Program (AGP) is a multi-donor funded comprehensive program anchored in the Ethiopian government's focus on increasing sustainable agriculture growth. As a major component of the government's five-year Growth and Transformation Plan (GTP) and a potential extension well into next GTP, AGP complements existing programs, and promotes agricultural growth in targeted, potentially rich, but underdeveloped woredas of the country.

② **Sesame business network, Agribusiness and Market Development (AMDe)** project in AGP woredas, led by implementation partner ACDI/VOCA, Agriteria and SNV are an NGOs which works in close collaboration with regional agricultural research centers and RBoA in Ethiopia in sesame value chain.

(4) Financial institutions

① **The Commercial Bank of Ethiopia (CBE)** is the largest commercial bank in Ethiopia with assets of 158.11 billion Birr as on June 30th 2013. With its extensive network and huge resources, the bank can play indispensable role in addressing the financial needs along the sesame value chain.

② **Other Financial Institutions.** Other financial institutions including banks, credit and savings institutions, other MFI's and Rural Savings and Credit Organizations, etc. all have a significant role to play in enabling financial access to sector players for inputs, output financing and equipment purchases. Major institutions in this regard include Dedit saving and credit, Amhara Credit and Savings Institution (ACSI), Oromia Credit and Savings Share Company (OCSSCO), Omo Micro Finance (OMO).

7.4 Bottlenecks and intervention measures

The *Ethiopia Sesame Sector Development Strategy* listed five stages of the value chain, including:

① research and technology development; ② input production, supply and distribution; ③ on-farm production; ④ post-harvest handling and agro-processing; ⑤ marketing.

The *Strategy* identifies 27 challenges that hinder Ethiopia's sesame development, mainly including: ① improved seed varieties are not effectively developed, produced and distributed; ② agronomic practices are not effectively researched and disseminated to farmers; ③ cooperatives

do not have the capacity to meet input and yield demand of farmers. The *Strategy* also identified 44 interventions for the above challenges and proposed detailed action directions, as shown in the following table (Table 7-2).

In order to transform the sesame industry, the *Strategy* also proposed solutions, pointing out that Ethiopia is focusing on: ① continuing to export to its conventional market; ② further diversifying towards higher value conventional markets; ③ entering premium markets; ④ increasing the volume of value addition.

**Table 7-2 Challenges and proposed intervention measures
for Ethiopia's sesame industry value chain**

Value chain link	Challenges	Proposed Intervention measures
Research and Technology	Improved varieties are not consistently developed across time and agro-ecologies	Enhance the breeding efforts of sesame through modern technologies of plant breeding Multiply sufficient early generation seeds
	Limited capacity building for sesame research	Build capacity of sesame research in the country Enhance skill and knowledge level of researchers Develop infrastructure for sesame research
	Current sesame varieties used by farmers have suboptimal agronomic and market attributes	Implement agro-ecology based and suitable agronomic practices Strengthen market-oriented sesame variety development and promotion Develop shattering tolerant sesame varieties
	Recommended agronomic practices and pest management are not exhaustive and use one-size-fits-all approach for agro-ecologies	Implement agro-ecology based research on critical agronomic practices Conduct coordinated research and provide safe and integrated control methods against pests
	Lack of sesame mechanization research	Implement research on critical mechanization technologies such as row-planter and harvester
	Weak research-extension linkage	Strengthen research-extension linkage to speed up technology dissemination
	Limited research on concentrated irrigated technologies for sesame production	Strengthen research on sesame production and irrigation technologies
	Limited socio-economic research in sesame	Conduct value chain analysis of sesame in major growing areas Application and impact study of improved sesame varieties in sesame growing areas
	Improved seed demand assessments do not accurately capture needs	Leverage the existing farmers extension service network for proper seed demand estimation
	Weak sesame seed system	Build capacity of the formal seed system (ESE/RSE) to effectively multiply and distribute improved seeds for different agro-ecologies of the country Introduce community-based seed system Encourage private sector in seed production and distribution

(Continued)

Value chain link	Challenges	Proposed Intervention measures
Input, production, supply and distribution	Poor capacity of FCUs to supply inputs	Build financial capacity of FCUs to meet the input demand of sesame production
		Strengthen linkage between sesame FCU and agro-chemical suppliers
	Limited access to input credit for sesame farmers	Establish and strengthen Rural Savings and Credit Cooperatives (RuSACCOs)
		Strengthen the micro finance institutions to deliver input voucher service
		Establish sesame fund
On-farm production	Farmers in major sesame areas have limited access to extension services	Enhance capacity building of agricultural experts at all level to provide sustainable extension service to farming community
	Lack of comprehensive information for sesame production	Develop comprehensive manual and package
		Address sesame production technologies through utilization of different information dissemination methods (websites, mass media flyers and posters)
	Mono cropping of sesame	Awareness creation on sesame cropping system
		Systematic study to alleviate the problem of sesame mono cropping
	Sesame production limited to some potential areas	Promote sesame production in other potential growing areas across the country
Post-harvest handling and processing	Inadequate scaling up of best practices	Scale up and popularize best agronomic practices for different agro-ecologies of the country
	Farmers in major sesame producing areas have poor post-harvest handling	Create the awareness of sesame post-harvest handling and scale up best practices
		Introduce appropriate post-harvest technologies
	Lack of labor management system	Create conducive environment for labor management system
	Limited access to infrastructure	Make available and develop appropriate infrastructure
	Very low scale of value addition	Provide conducive environment for processors and enhance sesame agro-processing industries
		Provide available sufficient quality and quantity raw material
Marketing	Low quality and insufficient volume	Make available good quality in sufficient volume
	Weak implementation of quality control system	Strengthen implementation of sesame quality control system
		Strengthen and promote sesame branding
	Limited participation of Primary Cooperatives and Unions in marketing	Build financial and technical capacity of primary cooperatives and FCUs to increase export volume to conventional market
		Build capacity of primary cooperatives and FCUs to effectively link sesame farmers to high value market
	Underdeveloped traceability and organic certification	Introduce traceability mechanisms and organic certification
	Weak market information and promotion system	Access to market information using different technologies
		Strengthen market promotion
	Limited access to infrastructure and logistic facilities	Make available and develop appropriate infrastructure and logistic facilities

8 Development experience of sesame value chain in China

Sesame is one of the important special oilseeds in China with a long production history and a production dimension extending across the nation. Sesame is widely used in oil extraction, food, medicine, chemical industry, etc.

8.1 China's sesame cultivation

China is one of the major sesame production countries in the world, while its yield had been in a significant downward trend since 2003, with a slight recovery in recent two years (Figure 8-1). In 2002, China's sesame production reached a peak of 900 thousand tons, accounting for 31.9% of the world's total yield, making it the largest sesame production country. In 2003, the yield began to fluctuate and decline. In 2018, China's total sesame production reached 430 thousand tons (China Statistical Yearbook, 2019), accounting for 7.2% of the world's total production, ranking sixth in the world (FAOSTAT, 2020).

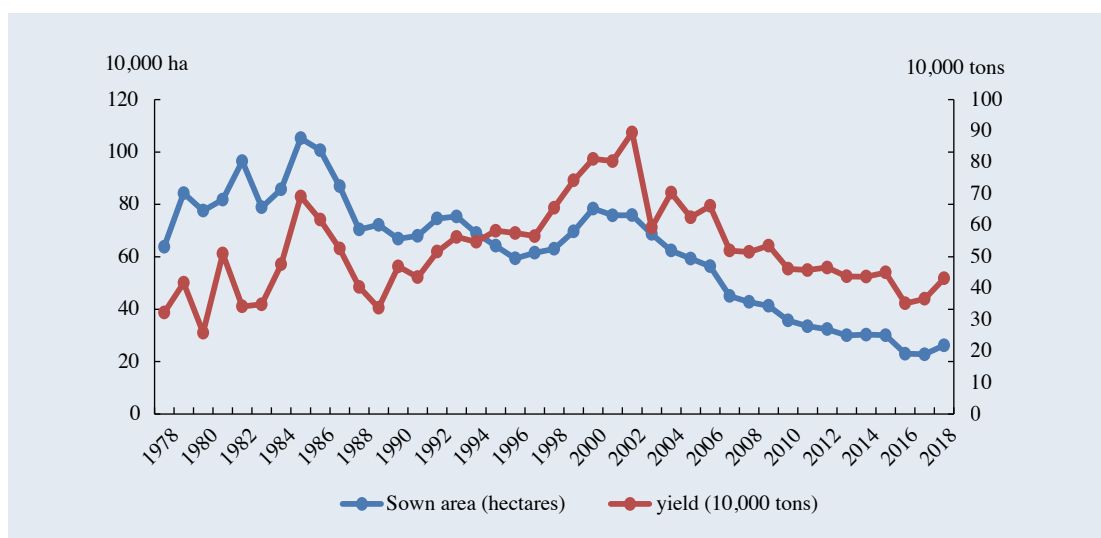


Figure 8-1 Sesame production and cultivation area in China (1978-2018)

Data source: China Statistical Yearbook.

The cultivation area of sesame in China is overall decreasing with fluctuations, while seeing a slight recovery in the past two years. In the early days of the founding of the People's Republic of China, the sesame cultivation area was 1.06 million hectares, and then fluctuated between 0.6-1.06 million hectares. Since 2003, many factors together have led to the sharp decline of sesame planting area: ① China's agricultural industrial structure is adjusted to ensure food security; ② in the main production areas, farmers' income from sesame cultivation is lower than that from other autumn harvested crops such as corn; ③ a large number of young and

middle-aged labor force go to the city to work, and thus farmers prefer crops that suit mechanized harvesting; ④ domestic production was impacted by the large volume of affordable sesame import. In 2017, the sesame cultivation area fell to a record low of 240 thousand hectares. Since 2017, the price of sesame has remained high, highlighting its income advantages compared to other economic crops. The governments of Henan, Anhui and other major production areas also implemented subsidy policies for sesame growers. The cultivation area began to recover and grow as a result. In 2018, the cultivation area was 260 thousand hectares (National Bureau of Statistics of China, 2020), ranking fifth in the world (FAOSTAT, 2020). In recent years, the sesame varieties that fit mechanized planting and harvesting and the R&D of agricultural machinery have seen substantive breakthroughs, and will soon make mass production available. China's sesame cultivation area and yield will be expected to realize sustained restorative growth.

The sesame unit yield in China has continued to increase, and has long been in the forefront in the world. In 1978, yield of sesame in China was 505 kg/ha. Since then, except for being affected by abnormal weather conditions and other natural factors, sesame unit yield has maintained an upward trend (Figure 8-2). In 2018, China's sesame unit yield was 1,645 kg/ha, 3.3 times that in 1978, and it's 3.2 times that of the world average 512 kg/ha, ranking the first in the world in terms of sesame unit yield.

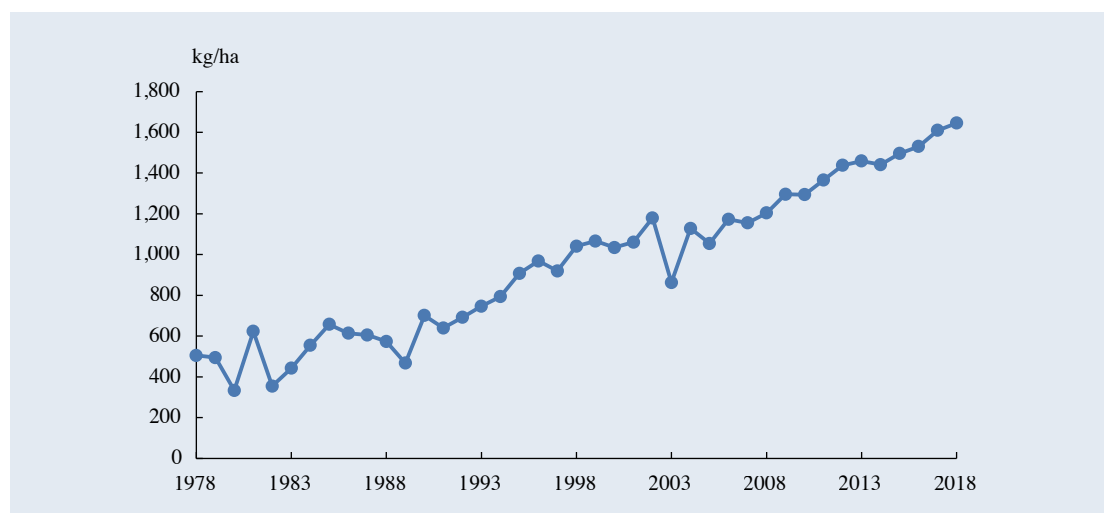


Figure 8-2 Sesame unit yield in China (1978-2018)

Data source: China Statistical Yearbook.

Sesame is widely planted in China with concentrated production areas. Except for Qinghai and Tibet autonomous regions, all other provinces and autonomous regions across China have sesame production areas. From southern China to northern China, there are three cropping systems: one cropping per year, double cropping per year and triple cropping per year. Yangtze River, the Yellow River and the Huai River regions and Northeast China mainly grow white

sesame; south of the Yangtze River features black sesame. Sesame production is concentrated in the three basins of the Yangtze River, the Yellow River and the Huai River, and the main production provinces are Henan, Hubei, Anhui and Jiangxi. The sesame area and total yield of the four provinces account for about 70% of that in China.

Sesame production in China has long been dominated by independent smallholder farmers. In recent years, large-scale and organized productions have begun to emerge. Since the founding of the People's Republic of China, sesame production has been mainly conducted by independent smallholder farmers with government guidance provided in key production areas. Traditionally, a smallholder farmer has 0.15-3 hectares of cultivation area. In recent years, with the implementation of the national land transfer policy, some large sesame farmers began to appear, with the production scale ranging from around 7 hectares to 700 hectares; sesame production has also begun to be organized by companies or farms, for example, the production area of one company in Hubei province has scaled up to 666 hectares.

At present, the model that is rapidly developed and used in large-scale organizations is "agricultural cooperatives + growers". The general scale of this model is more than 70 hectares, and it can reach more than 1,000 hectares in larger scales. In recent years, as these new agricultural cooperatives play an increasingly leading role, these cooperatives are not only the operation bodies, but also have a variety of functions. They can sell agricultural materials such as pesticides, seeds and fertilizers to farmers, provide farmers with paid services for agricultural machinery operation, organize sales of agricultural products, negotiate prices with purchasers, and invite agricultural experts to give technical training for new-type professional farmers in the region, and to provide farmers with all kinds of agricultural information, etc. As a result, smallholder farmers' trust for and dependence on the cooperatives grow, and this model developed rapidly.

8.2 China's sesame varieties R&D

The improvement of sesame varieties since the foundation of the People's Republic of China has undergone three stages⁴. The first stage is the first 20 years since the founding of the People's Republic of China (1949-1969), when pedigree selection was the main method, which is selecting well-performing varieties or strains from the original local varieties for further use. The second stage is 1970-1989, when conventional hybrid breeding, pedigree selection and mutation breeding were integrated. The third stage is from 1990 to the present, when the main method remains the conventional hybrid breeding while keeping pedigree selection and mutation breeding methods. With the development of nuclear male sterile materials and molecular markers, the heterosis utilization of male sterility and molecular marker assisted selection breeding have been conducted. The main varieties of each stage are shown in the following Figure 8-3.

The main sesame varieties in China are white sesame and black sesame, of which the quality of

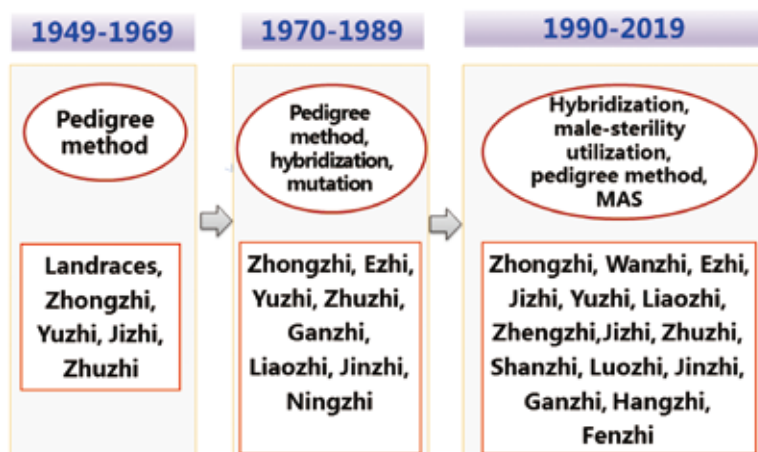


Figure 8-3 Three variety renewals since the founding of the People's Republic of China

white sesame is particularly high. In recent years, with the improvement of varieties, the quality of white sesame has seen continuous improvement. China's white sesame has more than 55% of oil, about 20% of protein, and is sweet in taste. It can be used for both oil and food.

A large variety of high yield and quality sesame are registered in China. At present, there are more than 180 varieties in nearly 20 series, including Zhongzhi, Ezhi, Yuzhi, Zhengzhi, Zhuzhi, Luozhi, Ganzhi, Wanzhi, Shanzhi, Jinzhi, Fenzhi, Liaozhi, etc. For example, "Zhongzhi 11" (Figure 8-4), a white sesame bred by the Oil Crops Research Institute of Chinese Academy of Agricultural Sciences (OCRI, CAAS), has tall plant, high yield, high quality, disease resistance, stress resistance and other preferable characteristics. It has a fragrant and sweet taste and a yield of 1,500-3,000 kg/ha, a growth period of 95-110 days, oil content of 55%-59%, 1,000 grain weight of 2.8-3.0g.



Figure 8-4 High yield, high quality and stress resistant variety, "Zhongzhi 11"

8.3 China's sesame production technology R&D and application

8.3.1 Mechanized sesame production

Since 2000, sesame production in China has entered the mechanization stage. With the rapid development of the Chinese economy, massive rural labor force is moving to the cities, the labor cost increases every year, and the demand for large-scale production of sesame increases significantly. Therefore, China has developed a series of sesame mechanization technologies and bred new varieties suitable for mechanized harvest. The mechanized equipment and varieties have reduced the production cost from 15,000 RMB/ha to about 10,425 RMB/ha (Research in Ezhou, China, 2019, land transfer cost included), and is being demonstrated and promoted in the main sesame production area at scale. This will promote the transformation from smallholder farmer to large-scale sesame cultivation, and promote the recovery and increase of sesame area in China.

China's sesame mechanization technology has been applied in the production links of seeding, disease, pest and weed control, harvest, etc., details as follows:

(1) Mechanized joint direct seeding technology. Using the machine to complete seven processes, including land tillage, ridging, trenching, fertilization, seeding, covering soil, spraying herbicides, the production efficiency is 0.35 ha/hr (Figure 8-5).



Figure 8-5 Sesame mechanized direct seeding

(2) **Unmanned aerial vehicle (UAV) control technology.** In order to control pests and diseases, UAV was used to spray pesticides; plant hormones were used to control plant height at seedling stage; desiccants were used to control water content at harvest stage. The production efficiency is 3 ha/hr (Figure 8-6).



Figure 8-6 UAV spraying pesticides or plant regulators

(3) **Mechanized joint harvest technology.** Using the joint harvester made in China to harvest sesame, the following results can be achieved: the impurity content of the machine harvested sesame is less than 10%, the seed damage rate is less than 1%, the total loss is less than 15%, and the production efficiency is 0.6 ha/hr.

According to the data from the field survey conducted by OCRI in Ezhou in 2019, in addition to the cost of purchasing agricultural machinery, the production efficiency of mechanized sesame production can be increased by more than 10 times than that of manual operation from land preparation to sowing, and the production efficiency of mechanized harvesting is about 100 times than that of manual operation. Compared with manual planting, the mechanized production mode can reduce labor by 72 persons/ha, which is equivalent to 7,200 RMB (100 RMB/unit labor wage). Moreover, all straw is crushed and returned to the field, which is conducive to soil fertility and is environmentally friendly. Using the mechanized cultivation model, the total production cost of large-scale farmers can be reduced by 3,690 RMB/ha, a 36% drop compared to the traditional manual planting model (Figure 8-7).



Figure 8-7 Sesame joint harvest techniques in China

8.3.2 Main high yield sesame cultivation techniques

First, according to the characteristics of the varieties, properly increase the cultivation density to increase the unit yield. Proper increase of cultivation density can increase the number of sesame plants per unit area, so as to expand the leaf area coefficient, make full use of light, water, carbon dioxide and inorganic salts, better turning them into more organic substances and economic yield in growth. The yield of sesame area with reasonable high-density cultivation according to the variety characteristics generally increases to 1,125-2,250 kg/ha, highest up to 3,000 kg/ha. China widely uses single stem varieties in sesame seeds production, mostly by mechanized seeding or manual seeding. The row spacing is 25-35 cm, the plant spacing is 13-20 cm, and the density is about 150,000-225,000 plants/ha.

Second, the application of chemical fertilizer is an important measure to increase production. Scientific fertilization according to the level of soil fertility and the fertilizer demand rules of the varieties can significantly improve the yield. Research results showed that 4.48 kg of nitrogen, 1.015 kg of phosphorus and 4.5 kg of potassium needed to be absorbed for each 50 kg of sesame seed. In China's sesame production, generally when the land is prepared before seeding, nitrogen, phosphorus and potassium compound fertilizer (N:P:K=15%:15%:15%) of about 225-375 kg/ha is applied per hectare as the base fertilizer. Then at the initial flowering stage, nitrogen fertilizer (urea) is applied as appropriate according to the growth of seedlings, and the general

dosage is about 75 kg/ha.

Third, comprehensive prevention and control of diseases, insect pests and weeds. Selecting resistant varieties, spraying pre-seedling herbicide (s-metolachlor) after sowing and covering soil, spraying herbicide (quizalofop-p-ethyl) at seedling stage, controlling pests at seedling stage and full flowering stage, timely drainage of waterlogging after rain and irrigation during drought are all effective agricultural measures to ensure high and stable yield, reducing damage and increasing yield by 10%-30%.

8.4 Sesame processing sector in china

China has advanced sesame oil production technology, and has independently developed a complete set of sesame oil production equipment. The R&D of oil production technology is advancing towards greenness, nutrition and high value addition. It mainly includes high-temperature baking oil production technology (high-temperature fried seeds <180°C, hot pressing, water extraction, leaching) and low-temperature oil production technology (fried seeds temperature at 60-90°C, pressing, cold pressing, extraction). Up to now, China has formulated and issued 6 national standards to standardize the quality and safety related index values of sesame oil processing and to control risk factors. The complete set of sesame oil production equipment independently developed by China performs well in controlling the health-related risk factors in the processing.

There are a large number of sesame processing enterprises in China, mainly in Henan, Anhui, Shandong and some other places. Their main business is sesame oil, sesame paste and sesame seed processing. In recent years, China's sesame processing enterprises have made rapid development in the processing and production of cold pressed sesame cooking oil, sesame snacks and sesame health care products.

Among them, sesame oil production cluster is mature. There are over 100 sesame oil processing enterprises of certain scale, with businesses ranging from pressing oil production, sesame cake circulation, production of sesame cake "leached oil", production of sesame "refined oil", to the production and sales of sesame seed powder. The production chain is complete and has a strong competitive advantage in terms of production in large-scale and in industrial chains. The following enterprises are some of the large sesame oil processing enterprises in China: Hefei Yanzhuang Edible Oils Co., Ltd., Yihai Kerry Arawana Holdings Co., Ltd, Shanghai Flavor Full Oil Food Co., Ltd., Ruifu Sesame Oil Co., Ltd., Shandong Luhua Group Co., Ltd., Anhui Hua'an Food Co., Ltd., etc. Besides, there are a great number of small and medium-sized sesame oil processing enterprises. Concentrated production areas include Hanshan County of Anhui Province, Nanyang City of Henan Province, Zhumadian City of Henan Province, Daming County of Hebei Province, Zaoyang City of Hubei Province, etc.

Selected-color sesame processing enterprises are mostly located in Qingdao, Shandong Province and Anqing, Anhui Province. Food sesame seed processing enterprises are in great numbers. Major sesame seed processing enterprises include ETG (Tianjin) Grain and Oil Co., Ltd., Jiangsu Foma Grain and Oil Co., Ltd., Anhui Longxi International Trade Sesame Oil Manufacturing Co., Ltd., Hebei Houxin Grain and Oil Co., Ltd., etc. There are a large number of small and medium-sized sesame seed factories, mainly concentrated in Guoyang County of Anhui Province, etc.

Sesame paste and sesame snack food processing enterprises mainly include: Nanfang Black Sesame Group Co., Ltd., Anhui Yanzhifang Food Co., Ltd. and Shandong Zhiweixuan Food Co., Ltd., Shandong Shilixiang Sesame Product Co., Ltd.

In recent years, the technology of sesame deep processing has also been improved, and the “oil-protein-sesamin” integrated production model has been successfully developed. Sesamin extraction and processing enterprises are mainly concentrated in Xi’an, Shaanxi Province and main manufacturers are Hebei Gongchuang Biotechnology Co., Ltd., Xi’an Zelang Biotechnology Co., Ltd., Xi’an Qiuhe Biotechnology Co., Ltd., Shaanxi Taike Biotechnology Co., Ltd., etc.

8.5 Development experience

Looking back on the development of China sesame industry, although the sesame production area has declined significantly due to various factors, as China’s economy rapid develops and people’s living standard levels up, consumption of sesame increases and demands vary, pushing the sesame industry value chain upward gradually. China is strong in sesame production technology R&D and maintains no.1 in the world in the sesame unit yield, and the sesame processing sector continues to grow in leaps and bounds. The development experience is summarized as the following three points.

First, governments at all levels set up projects to provide financial support for the cultivation of R&D teams and R&D platforms. Since China’s Reform and Opening Up, the Ministry of Science and Technology of China, the Ministry of Agriculture and Rural Affairs, and the provincial science and technology departments of the main production areas, such as Henan, Hubei, Jiangxi, Shanxi and Hebei, have set up science and technology project funds to support sesame research. Since 2008, the Ministry of Agriculture has set up China Agriculture (Sesame) Research System (integrated into the China Agriculture (Special oil) Research System since 2017), with an annual investment of 12 million RMB to organize sesame researchers nation-wide to tackle scientific and technological problems. At present, there are about 300 scientific delegations engaged in sesame breeding, agricultural techniques, processing and quality examinations, and more than 10 professional laboratories.

Second, great efforts were made to popularization and application of scientific research results to promote the improvement of China’s sesame industry value chain. China

has a huge technology promotion system from the Ministry of Agriculture and Rural Affairs to the provincial, county, city and township levels, and the scientific and technological achievements developed by scientists and researchers will be demonstrated and popularized by the departments in charge of promotion. In addition to the national promotion system, China also promotes market demand oriented R&D cooperation between science and research institutions and enterprises, which has achieved success, for example, The Oil Crops Research Institute (OCRI) of the Chinese Academy of Agricultural Sciences (CAAS) cooperation with Hefei Yanzhuang Edible Oils Co., Ltd.,

Wuhan Good-seed Technology Co., Ltd., Hefei Fengle Seed Co., Ltd., etc., with remarkable achievements in promoting seed industry, improving processing technology, raising product quality, etc.

Third, China's diversified consumption demand drives the rapid development of the processing sector. In recent years, China's demand for tourism, leisure and quality lifestyle has increased dramatically, and sesame processing products have been obviously orienting on nutrition, leisure and convenience. The powerful sesame consumption terminal guides the active supply of the vast number of enterprises. Currently, there are hundreds of existing oil manufacturing enterprises and thousands of diverse processing products. Sesame oil and food processing technology mainly focuses on reducing hazard factors, retaining more nutrients, oil-protein-sesamin integrated production, reducing environmental pollution caused by waste, nutritional health, increasing value addition and greenness. However, China's sesame oil and edible products are still basically primary processing. There is still room for the nutrients extraction, product transformation and upgrading, targeted product development for different specific groups, and utilization and development in medicine, chemical industry and other fields to improve value addition.

8.6 Comparison of sesame production between Ethiopia and China

Ethiopia and China sesame industry have different development goals and are in different stages of development. In general, Ethiopia at present is similar to China during the 1980s to the early 1990s (Table 8-1).

In terms of the aim, domestic consumption demand for sesame is low in Ethiopia, and sesame is mainly for export for foreign exchange and provide for farmers' employment; while Chinese production is mainly to meet the domestic consumption needs.

In terms of production, Ethiopia is in the stage of low and medium yield, dominated by traditional labor cultivation, while China has entered the stage of high yield since 2000, and modern and efficient production has developed rapidly. China's sesame cultivated area keeps declining. At present, Ethiopia's sesame cultivated area has exceeded that of China, but its unit yield is low and its total yield is only about half that of China. At present, the unit area production of Ethiopia

is equivalent to that of China in 1993. Ethiopia's breeding techniques are still based on pedigree selection, which is the main breeding method in China before 1970. The number of germplasm resources and varieties kept in Ethiopia is equal to the level of China in the 1980s. In terms of cultivation techniques, Ethiopia mainly depends on human labor, which is equivalent to that in China before 2000; Ethiopia rarely applies pesticides and chemical fertilizers, which is equivalent to that in China before 1980. In addition, Ethiopia has a relatively high level of organization in sesame production, while China's sesame production is smaller and loosely organized compared to Ethiopia.

In terms of processing, Ethiopia's sesame processing is very weak at present, mainly processing sesame paste and hulled roasted sesame. The number of people engaged in this sector is small, and enterprises of some scale are few, and sesame oil production has not yet started but some farmers crush sesame oil traditionally using draft animals locally named "Asera" (Table 8-1).

Table 8-1 Comparison between current sesame production in Ethiopia and similar period in China

Project	Ethiopia (2018/19)	China
Industrial development objectives	Exporting for foreign exchange, solving employment and increasing livelihood income	Meeting the needs of Chinese people
Color of sesame seed	White, gray, brown and black	White, black
Oil content of varieties	48% -56.7%	Above 55%
Cultivated area (1,000 ha)	295	262 (2018, the lowest since the founding of the People's Republic of China)
Total yield (10,000 tons)	20	24 (1977) 43 (2018)
Unit yield (kg/ha)	683	744 (1993)
Breeding Techniques	Mainly system breeding	Before 1970
Number of varieties	30	32 (1989)
Quantity of Germplasm	1,500	1556 (1981)
Cultivation technique	Mainly manual	Before 2000
Application of chemical fertilizer and pesticide	None or small	Before 1980

9 China's sesame consumption and import

China is the world's largest consumer and importer of sesame, accounting for about one third of the world's total consumption, and nearly half of the world's imports, playing a vital role in the global sesame market.

9.1 China's sesame consumption

China is the largest sesame consumer country. The consumption continuously rises but there is a huge gap between supply and demand. Sesame is a traditional agricultural product and favored food in China. Sesame oil and sesame paste are popular with consumers. Sesame is widely used as food or food ingredients, and there are various kinds of processed products, such as hulled sesame, sesame Tangyuan, sesame paste, sesame powder, sesame pancake, sesame cake, sesame tea, etc. Sesame products are also widely used in medicine and industry, such as high-quality massage oil, ointments, lubricants, cosmetics, industrial lubricating oil, soap, etc. Sesame cake protein is high-quality protein, which is rich in leucine, isoleucine, phenylalanine and other elements. Sesame can be processed for sesame protein products as well as for fine feed or high-quality fertilizer.

In recent years, with the continuous improvement of people's income level and enrichment of food processing category options, the pursuit of higher quality lifestyle has led to the significant increase in sesame consumption. In 2019, China's sesame consumption was 1,280 thousand tons, a 51.4% rise compared to that in 2013, accounting for about 35% of global sesame production. However, China sesame production has been declining since 2003, and the gap between supply and demand widened. In the recent two years, with the increase of domestic production, the gap has slightly narrowed (Figure 9-1).

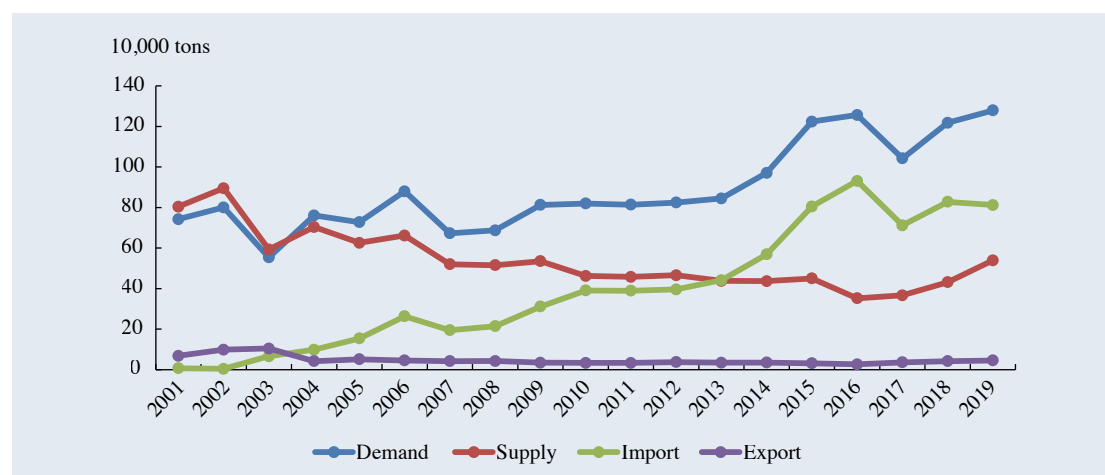


Figure 9-1 Sesame supply and demand in Chinese market 2001-2019

Data source: www.fao.com.cn.

9.2 China's sesame import

In recent years, China's sesame import volume has also ranked number one in the world. Up to 65% of its demand depends on imports. In 2019, China imported 810 thousand tons of sesame, accounting for about 47.3% of global imports. Before 2002, China was a net exporter of sesame seeds. With the increasing gap between supply and demand of sesame, China has gradually turned into the largest import country. China's dependence on imported sesame once nearly approached 75%. In the past two years, with the improvement of sesame cultivation benefits, this dependence slightly narrowed (Figure 9-2).

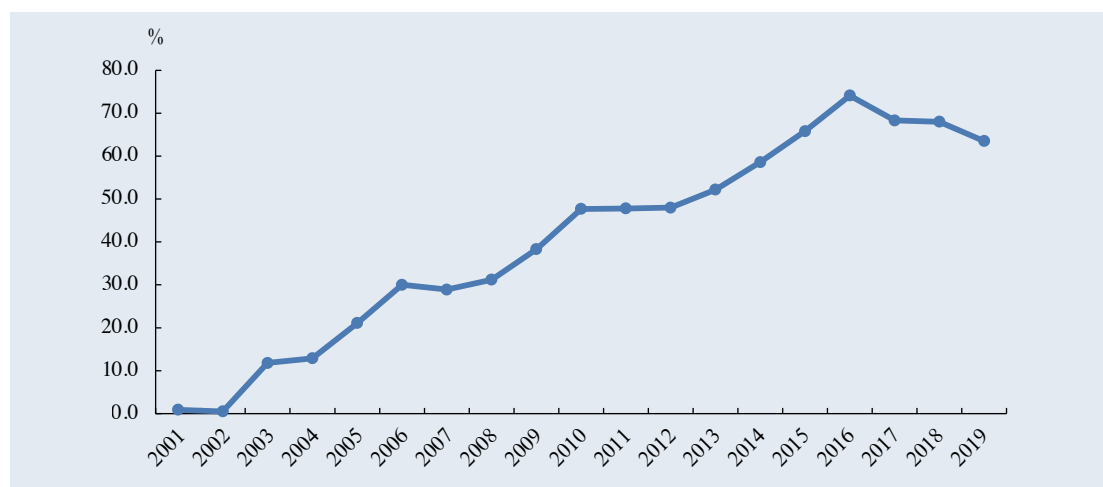


Figure 9-2 Dependence of Chinese market on imported sesame

Data source: calculation of data from www.fao.com.cn.

African sesame is the main source of sesame import for China. In 2019, 790 thousand tons of sesame were imported from Africa, accounting for 98% of China's total sesame imports. Benefited from China's tariff free treatment and price advantage, sesame from Ethiopia, Sudan, Nigeria, Togo, Tanzania, Mozambique, Uganda and other African countries has become China's main sources of sesame imports.

9.3 Sesame trade between China and Ethiopia

Ethiopia used to be the largest source of sesame import of China, but in recent years, China's Ethiopian sesame import volume has declined significantly. Before 2018, China had remained Ethiopia's largest sesame export country. Ethiopia once occupied 48% of China's sesame import market share in 2012, and exported 300 thousand tons of sesame to China in 2016, amounting to 330 million US dollars, reaching the peak of the bilateral sesame trade. However, due to the high price of sesame in Ethiopia in recent years and other factors, the enthusiasm of Chinese importers of Ethiopian sesame declined significantly. At the same time, the foreign exchange income from

exports to China was forced to settle, which damped the enthusiasm of Ethiopian sesame exporters to China greatly as well. This resulted in only 110 thousand tons of Ethiopian sesame exported to China in 2019, lagging behind Sudan, 170 thousand tons, and Nigeria, 160 thousand tons. But Ethiopia remains one of the main sources of sesame import countries of China (Figure 9-3).

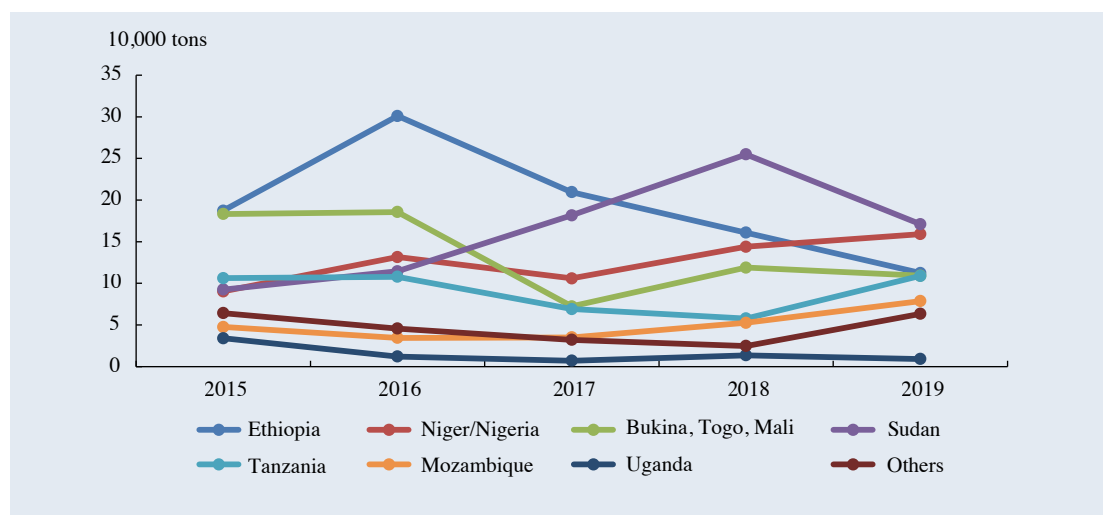


Figure 9-3 China's main sesame import countries (2015-2019)

Data source: calculation of data from www.fao.com.cn.

9.4 Global sesame price analysis

In recent years, with the continuous expansion of sesame cultivated area in Africa, the global supply of sesame is relatively sufficient. The price of sesame fluctuates periodically, and is overall controlled by the periodic changes in the supply-demand relationship and the impact of short-term fluctuations.

The periodic changes in the supply-demand relationship are automatically regulated by the market. In the long term, a cycle is about five years. When the price goes up, the sesame growers become more active and the cultivated area expands, which leads to oversupply, followed by a price drop, the declined activity of sesame growers and decreased cultivated area, and then the supply drops below demand, leading to the price going up again. This cycle goes on. There are various factors influencing the short-term fluctuation. The main factors are changes of China market demand, weather conditions of the main producing areas and exchange rate changes. In addition, unexpected political and economic events also have a short-term impact on sesame prices.

In recent years, sesame prices have seen dramatic fluctuations. Ethiopia's grade 1 sesame price peaked at 2,200 US dollars/ton in January 2014, while the lowest global sesame price was only 870 US dollars/ton in November 2015. In 2019, the global sesame production reached another new high. After the Tanzanian sesame was launched in the market, the sesame price fell from 1,700 US dollars/ton all the way to the lowest 1,250 US dollars/ton.

10 Field research of sesame industry value chain in Ethiopia

After several months of joint preparation, FECC and ATA led a research delegation to Ethiopia to conduct field research on the sesame industry value chain during November 10th to 16th, 2019. The delegation consisted of 12 members who were agricultural experts, including 3 experts of variety, cultivation technology R&D, processing, trade, etc., and 6 representatives from well-known enterprises in the industry, and also officials from Partnership for Investment and Growth in Africa (PIGA) project of the UN International Trade Center and officials from African Green Revolution Alliance (AGRA).

With the close cooperation of ATA, the delegation focused on important links of sesame value chain and conducted 12 intensive research activities in 6 days. The delegation introduced the development experience of China's sesame industry value chain and the demand for sesame trade, visited the key stakeholders in the sesame industry value chain of Ethiopia, including the MoA, ECX, Ethiopian Pulses, Oilseeds, Spices processors and Exporters Association (EPOSPEA), tahini processing plants, sesame seed cleaning plants, etc., and visited one of the main sesame production areas of Ethiopia – Humera area, where the delegation conducted field visits to large state-owned agricultural enterprises, smallholder farmers association, farmers service center, Humera Agricultural Research Center (HuARC), ECX Humera warehouse, ECX Humera e-commerce center, etc. The delegation also paid visits to relevant institutions and experts, such as the Economic and Commercial Consular's Office of the Chinese Embassy in Ethiopia and China's senior expert group in Ethiopia.

During the investigation period, MoA of Ethiopia gave the delegation strong support. Adviser to the Minister of State of MoA of Ethiopia introduced the overall status of sesame development in Ethiopia to the delegation and listened to the introduction of Chinese experts on the development experience of China's sesame value chain, China's sesame consumption demand and market development. He expressed the interests to cooperate extensively with China on sesame variety improvement, mechanized cultivation technology and sesame processing investment. His excellency state minister of MoA of Ethiopia met with the delegation after the delegation completed the field visit to the main sesame producing areas in Ethiopia, listened to the experience sharing presentation of China's sesame value chain development and the outcome of the delegation's research in Humera. The two sides had in-depth discussions on the main issues restricting the development of sesame in Ethiopia and the direction for future cooperation, and expressed their commitment of their support to future cooperation.

Through the investigation, the delegation collected rich first-hand information and understood the current status and key issues of the main links of the sesame industry value chain in Ethiopia more intuitively.

10.1 Macro-level support

Oriented on sesame export, Ethiopia government closely links all stakeholders of sesame value chain, especially in production and trade links where a mature organizational system has been in place. The Ethiopian government has set an ambitious goal for the sesame industry, planning to increase the yield of sesame to 440,000 tons by 2020.

Officials from the MoA of Ethiopia believe that finance is the biggest problem restricting the development of sesame in Ethiopia. For example, the investment in sesame R&D is insufficient, the financial services available to sesame producers are very limited, and agricultural inputs such as agricultural machinery and fertilizer are difficult to purchase and use on demand.

The leaders of the MoA of Ethiopia, officials of local agricultural research centers, large-scale farm owners and the head of smallholder farmers' cooperatives all showed great interest in developing sesame industry value chain cooperation with China. They hope to introduce high-yield sesame varieties and applicable production technologies and agricultural machinery from China, improve the sesame yield of Ethiopia, reduce production costs, increase export volume and increase the income of farmers. Also, it is hoped that Chinese enterprises will invest and build factories in Ethiopia to develop the sesame processing sector (Figure 10-1).



Figure 10-1 State Minister and Adviser to the Minister of State of MoA of Ethiopia Meeting with the delegation

The government provides incentives to encourage the private sector to invest in sesame processing sector. Incentives mainly include: ① provide land leasing subsidies to private entrepreneurs; ② at least 50% of the products exported or supplied to Ethiopian domestic market by agro-processing investors can be exempted from income tax for five years; ③ investors in priority regions are eligible for an additional one-year income tax exemption; ④ agricultural and industrial machinery and equipment and raw materials enjoy 100% import tax exemption.

The government has also built industry clusters in the country to transform the sector. Among

these Beaker Integrated Agro-Industrial Park (More details see Annex 2) is located at Humera area to serve the Tigray and Amhara sesame clusters and it is attracting investment.

10.2 Research and technology R&D

10.2.1 Variety R&D

In order to understand the research, development and use of sesame varieties in Ethiopia, the delegation visited Humera Agricultural Research Center (HARC) and other institutions. The center was founded in 2002 and is a subsidiary of the Ethiopian Agricultural Research Institute. It has 4 disciplines and 17 people are engaged in sesame research (11 university degree holders, 4 master's degree holders and 2 Ph.D. students). The national-level new sesame variety registration test of Ethiopia is organized and implemented by the center, and the varieties that pass the test shall receive a certificate issued by the Plant Variety Release, Protection and Seed Quality Administration of the Ministry of Agriculture. By 2019, 30 sesame varieties have been bred in Ethiopia all of which are pedigree selected. Among them, new varieties such as Setit-1, Setit-2, Setit-3, and Humera-1 developed by the center are suitable for cultivation in rainy areas.

Humera Agricultural Research Center has 2,000 germplasm resources and breeding materials, which are preserved at room temperature (temperature 25-35°C, average humidity 65%), and there is no special low-temperature storage (cold rooms) or refrigerators for resource preservation. Every year, a proportion will be cultivated, and quality materials will be selected in the hope of breeding quality varieties. The maximum unit yield of the sesame varieties cultivated in the center is about 800-1,100 kg/ha. If the farmers do not apply chemical fertilizer after cultivation, the yield can reach 300-450 kg/ha; if the chemical fertilizer of 150 kg/ha (100 kg/ha NPK and 50 kg/ha Urea) is applied, the yield per unit can reach 1,200 kg/ha.

Sesame harvest in Ethiopia was over during the delegation's research period. According to the observation of the sesame plants being dried in the sesame field of the farms and in HARC, the varieties currently planted in Ethiopia are branched, having single capsule (one capsule in each leaf axil), with poor capsule forming ability (the upper part has sparse capsule, and the lower part has no capsule), with thin stem, weak lodging resistance and large opening of capsule after ripe. These characteristics and lack of modern production technologies, abiotic stresses (recurrent drought and heat) and biotic factors (insect pests, diseases and weeds) and non-lodging resistance are corresponding to the low yield (Figure 10-2).

According to personnel from the center, there are many obstacles in the R&D of new varieties. One is that the breeding technique is lagging behind and only pedigree selection method is used, i.e., well-performed plants are selected from the sesame resource materials through characterization and selection and used as varieties directly, and single plant or line offspring of natural variation can also be selected. Modern techniques such as conventional hybridization, molecular markers

Crop varieties released by Humera Agricultural Research Center (HuARC) from 2003 on wards									
Sn	Commod ity	Variety	Year of released	Yield qt/ha research field		Oil content	Color		
					On farm				
1	Sesame	Setit-1	2003	7-10	5.5-9	52	White		
		Humera -1	2003	8-10	5-8	54	White		
		Setit -2	2016	7-11	6-8	53.7	White		
		Setit -3	2017	9-12		54.4	white		
Variety	Maturity	Altitude	Spacing		Seed rate kg/ha		Fertilizer /ha		D
			b/n rows (cm)	b/n plants (cm)	Row planting	Broad casting	DAP	UREA	
Setit-1	80-90	600-800	40	10	0.8-1.2	2-3	100	50	3
Humera -1	90-100	600-1100	40	10	0.8-1.2	2-3	100	50	3
Setit -2	80-87	600-1100	40	10	0.8-1.2	2-3	100	50	3
Setit -3	75-80	600-1500	40	10	0.8-1.2	2-3	100	50	3



Figure 10-2 Sesame varieties developed by Humera Agricultural Research Center

and genome selection have not been applied to breeding. Moreover, breeding researchers lack skills and knowledge required for this field. Secondly, there is a lack of greenhouse and other facilities to speed up breeding programmes, and breeding selection can only be carried out in one season (the rainy season) each year, resulting in slow breeding process. Thirdly, the experiment infrastructure is outdated. The delegation visited two laboratories of the center. One laboratory has a room with granulometers, microscopes, microwave ovens, scales, ovens, etc.; the other is larger with two rooms, equipped with wooden structure experiment platform, centrifuge, chemical analysis instrument, etc. All laboratory instruments came from assistance projects. The models are outdated. Also, these instruments are basically idle and unusable due to a lack of funding support for scientific research projects (Figure 10-3).

10.2.2 Production techniques R&D

In order to help farmers improve sesame productivity and quality, Humera Agricultural Research Center, with the support of MoA, EIAR, ATA, carried out cooperation with the Netherlands in terms of field production techniques, summed up the production management standard with 20 steps from land preparation to post harvest processing of sesame. Main measures include:

- ① seeding mode: in the seeding process, row seeding (the seeding amount is 2-3 kg/ha) is recommended as the production management standard. But in practice, the vast majority of sesame fields use scatter seeding (the seed amount is 4-12 kg/ha), which is not conducive to field management and operation.
- ② Application of chemical fertilizer: the use of chemical fertilizer during sesame planting is very limited. The officials in charge of agriculture and most farmers in Ethiopia believe that the local sesame does not use chemical fertilizer and pesticide, thus the products are green, organic and eco-friendly. But at the same time, very few examples of farmers who applied a certain amount of chemical fertilizer (150 kg/ha) and as a result achieved a substantial increase in production are highly promoted. However, most farmers do not use chemical fertilizers because they cannot afford as the price is high and not available on time



Figure 10-3 Humera Agricultural Research Center Laboratory

to farmers. Humera Agricultural Research Center has not carried out detailed experiment and research on the type and quantity of fertilizer applied to sesame. The center only recommended 100 kg/ha NPK and 50 kg/ha Urea, but no specific reference is provided for specific varieties and cultivated areas. ③ Pest control: the main diseases of sesame in Ethiopia are bacterial blight, fusarium wilt and phyllody; the main pests are sesame webworm, gall midge, stink bug and mealybug. In view of these diseases and pest pests, the center has not carried out the screening of prevention and control agents, and lacked effective prevention and control measures. ④ Mechanization: the center is also developing varieties suitable for mechanization. The center also says that if irrigation can be enhanced, the yield can be greatly increased.

The center expressed their earnest desire to strengthen comprehensive scientific and technological cooperation with China. One researcher of the center has been selected by the Ethiopian government to study in China for the Ph.D. degree. Also, the person in charge of the sesame project of the center attended the international sesame academic exchange meeting in China in 2019. The center expressed its hope to have more sesame breeding technicians go to China to study master's and Ph.D. programs and learn sesame breeding related technologies.

10.3 Inputs supply

10.3.1 Seed supply

Ethiopia lacks professional sesame seed companies. Farmers' retention is the main source of seed in Humera's main production area. Because the varieties used are not purified and reinvigorated, their resistance to disease, pests and stress is poor. Not only the yield is low, but also they are vulnerable to pests and diseases disasters which could cause a yield loss of 10%-20%. Farmers have an urgent need for seeds of good varieties.

Other sources of seeds are mainly from the Humera Agricultural Research Center. However, the supply capacity of improved seeds is very small, far from meeting the production needs. The center not only develops breeding and cultivation technology R&D, but also breeds the varieties selected by the center and sells seeds to farmers. The yield of improved seeds is 10%-20% higher than that of farmers' own seeds. The center has 200 hectares of land for seed production (not only for sesame, but also for other rotation crops), and has produced 189 tons of improved sesame seeds in the past five years. Only 5.8% of sesame area in Humera region uses improved seeds.

10.3.2 Agricultural supplies and production service supply

ATA has set up more than 100 farmer service centers across the country to provide agricultural services to all kinds of farmers and farm owners, organize farmers to attend new technique training, provide fertilizer, pesticides, growth regulators, agricultural tools and seeds, and provide farmers with agricultural machinery leasing services. Sesame industry can also get relevant support. At the Humera Farmer Service Center (under ATA), there are plant growth regulators (auxin), veterinary drugs (antibiotics, anti-parasitic drugs, etc.) and sprayers for sales, but no agricultural materials for sesame production. After inquiring the sales persons in the farmer service center, the delegation learned that there was no special or dual-purpose pesticide for sesame, and sesame farmers never purchased pesticide for pest control. But the center has Italian SFOGGIA seeder, which has been used in sesame seeding. The seeding effect is satisfactory, but the application area is very limited (Figure 10-4).





Figure 10-4 Humera Farmer Service Center

10.4 Field Production

10.4.1 Sesame production land is fertile while it lacks irrigation

Compared with the main sesame cultivated areas in China, Humera area is fertile, with a large area of continuous and flat arable land, which is very suitable for the development of mechanized cultivation. The soil is black soil with sand, which becomes muddy after irrigation or rain, hardens after drought.

The main sesame cultivated areas in Ethiopia is focused under rainfed production. There is no drainage or irrigation systems and facilities in the field, and the cultivation mainly relies on rainwater. Therefore, it often happens that the main sesame producing area in Ethiopia suffers from significant yield reduction during the time of large-scale drought (Figure 10-5).

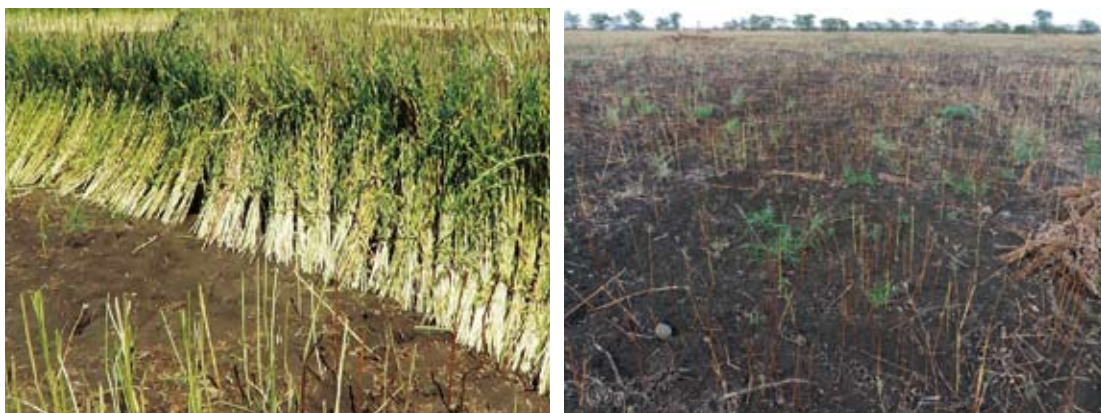


Figure 10-5 Flat, vast and fertile land in Humera

10.4.2 Sesame production in Ethiopia has a high level of organization, but the production cost is high

The high level of organization of sesame production in Ethiopia left a deep impression on the delegation. There are two models of sesame cultivation in Ethiopia, large and medium-sized farms

and smallholder farmers. In terms of production scale, a large farm has over 1,000 hectares per farm, a medium farm has 100-1,000 hectares per farm, and smallholder farmers in Humera have 5-10 hectares per farmer. Large and medium-sized farmers' formed an investors alliance, and smallholder farmers formed a farmers' association. The alliance and association provide members with agricultural materials, agricultural machinery and agricultural technology guidance, and purchase sesame seeds from members and sell to the ECX local warehouse. In addition, state governments use government funds to establish state-owned agricultural companies.

Hiwot agricultural company which the delegation visited is the largest state-owned agricultural company in the state of Tigray. The company has rich capital, 300 full time employees, 6,000 hectares of land, a large number of tractors and other agricultural machinery and equipment, and adopts mechanized farming to produce cotton, sesame, sorghum and other crops. The company is also one of ATA's mechanization service centers, providing agricultural machinery services for surrounding areas. Equipped with irrigation facilities, the company is one of the leading farms in Ethiopia that solely depend on rains for water with no need for irrigation. The sesame cultivated area of the company is 2,000-3,000 hectares, and the varieties are improved varieties (Setit-1 and Setit-2) provided by Humera Agricultural Research Center, with a unit yield of 400-600 kg/ha. The company's person-in-charge pointed out that the yields of the sesame varieties were not high, and he hoped to introduce high-yield sesame varieties from China. Although the company has a large number of agricultural machineries, the existing seeders are not suitable for seeding sesame seeds. In addition, the existing sesame varieties have big cracks upon capsule maturity, and the seeds can easily drop. The yield loss of using the harvester is big, so it is urgent to use sesame varieties without dropping seeds. Another problem is that there is no suitable sesame harvester. The company has purchased the made-in-Italy sesame baler, which is ready to be used in the next sesame production season for mechanized harvest, and then thresh manually. When he heard that there are sesame varieties suitable for mechanized harvest, mature sesame joint direct seeding machinery technology and joint harvest technology in China, he immediately expressed his hope to introduce them (Figure 10-6).

The delegation also visited the Desta Group farm. The farm began to develop at 350 hectares, with part of the land obtained from the government, part of the land rented from the surrounding farmers, and now it has developed into a large farm with about 1,400 hectares of land, with 51 employees, including 2 technicians. Sesame is its main crop. At least 700 hectares of land are arranged for sesame cultivation every year. Sorghum, mung bean, sunflower, mango and other crops are rotated in cultivation. There were about 1,000 hectares for sesame, 60 hectares for mango and 250 hectares for Sorghum in 2019 (Figure 10-7).

The cultivated sesame varieties are Setit-1, Setit-2 Setit-3 and Humera-1 provided by Humara Agricultural Research Center. The highest local record of these varieties is 800 kg/ha, the highest record in this farm is 540 kg/ha, and the farm owner's expected yield is 800 kg/ha. The growth period of sesame is 90-120 days. It is usually sown during the middle of June to the middle of



Figure 10-6 Agricultural machinery of large farms



Figure 10-7 Humera farm visit

July. The harvest begins at the beginning of October and is completed at the end of the month. Machinery is used in some part of the seeding process. 300 hectares of sesame seeds are sown by machinery, and the rest 700 hectares are sown manually, with a total of about 51 people for labor a day. In the harvesting process, a large number of workers are needed. If the whole farm is harvested at the same time, it will need about 3,500 people working for 7 consecutive days. Due to the seasonal use of sesame tools, a large number of workers need to come to the production

area from other regions, and the cost of transportation, accommodation and other expenses also increases its labor cost. The cultivation labor costs 100 birr/person/day and the harvest labor costs 300 birr/person/day. There is an urgent need for mechanized production technology of sesame, especially mechanized harvest technology.

The farm manager stated that adequate irrigation facilities and good field management are very important for sesame production to obtain high yield. But the farm lacked irrigation facilities for sesame field. In 2019, due to the delay of rainy season, serious drought occurred in the early stage of sesame growth, and pests (pests netting on the leaves, leaf wrapping) and diseases (stem blight) occurred in the middle and late stage, resulting in a unit yield decrease of 66.7% compared with the normal year, only 180 kg/ha. Some of the sesame harvested in farms are sold directly to ECX, and some of them can be sold to exporters after filed at ECX, which is less efficient than selling to ECX. Different varieties and grades can be sold at different prices. The price in November 2019 was 4,200 birr/ton (about 1,448 US dollars/ton).



Figure 10-8 Sesame in the field of farm in Humera (2019)

The delegation also visited a local smallholder farm association. The association has 3,000 smallholder farmers, each with a land area of 5-20 hectares, and a total of 27,000 hectares. There are also 80 production groups under the association. About 25 farmers form a group, and the farmers democratically select a group leader and three managers to organize joint production activities such as unified seeding and harvest. The cultivated area of each group is 65-125 hectares. To lease land, the price is 95 birr/ha/year. The unit yield of sesame is generally 300-700 kg/ha. After using improved seeds, applying fertilizer (150 kg/ha) and strengthening cultivation management, some groups have achieved a yield level of 1,225 kg/ha. Most of the sesame seeds are planted by hand, and only 2,400 hectares are planted by machines. There is a strong demand for agricultural machinery which is expected to be fully promoted in the future. The government provides training services for the association, and some loans to be distributed by the association. The association will give priority to providing members with inputs such as fertilizer at a discounted price, and it purchases sesame seeds at a price 15%

higher than the market price. The association hoards sesame seeds for a period of time and then sells them at a higher price for profit. It keeps the association running and pays dividends to its members.

From the above visits, one can see that the biggest cost of field production is labor cost, and the demand for sesame production machinery is urgent.

10.5 Sesame processing

According to statistics, Ethiopia has more than 190 licensed sesame exporters, including Chinese enterprises registered in Ethiopia. However, only a few companies try to improve the added value of sesame and carry out primary processing, such as processing hulled sesame, cleaning and selecting sesame for export. One of the delegate companies, Transsion, has built a sesame primary processing plant in Ethiopia. At present, the major established sesame processing enterprises in Ethiopia are listed in Table 10-1.

Table 10-1 Existing sesame processing plants in Ethiopia

Name	Factory location	Business scope	Capacity of production	Export destination
Ambasel Trading House	Amhara Gondar	Production and trade of hulled sesame and sesame paste	Hulled sesame: 2,200 tons/year Baked sesame: 1,500 tons/year Sesame paste: 900 tons/year	Hulled sesame and baked sesame are exported to low tariff countries in Asia and Europe; Sesame paste is exported to Morocco, Egypt and other North Africa and Mediterranean regions
Krotaj	Geta Industrial Park, Addis Ababa	Production and trade of sesame paste	4,000 tons/year	Israel, Germany, USA, UAE, Middle East
Selete hulling PLC		Production and trade of cleaned sesame and hulled sesame	Cleaned sesame: 840 tons/year and Hulled sesame: 1,560 tons/year	USA, Holland and Japan
Olera PLC		Production and trade of hulled sesame, and hulled roasted	Hulled sesame: 1,800 tons/year and Hulled roasted sesame: 200 tons/year	USA, Netherlands and Israel

The delegation visited Krotaj tahini processing plant, which uses Humera's high-quality sesame as raw material and adopts processing equipment imported from Germany, with an annual yield of 4,000 tons of tahini. All its tahini exports go to the Middle East market. Compared with the export of sesame raw materials, the export of sesame paste increased the added value by about US \$1,000 per ton.

Krotaj tahini processing plant has passed the ISO22000 certification, and the quality control of the production process is relatively strict. It can be seen in the laboratory of the processing plant that there are sampling tests for all links of production (cleaning, peeling, grinding, etc.). Krotaj tests the nutritional composition (such as fatty acid composition, protein content, sodium, calcium, etc.)

of the product and other indicators required by customers, but it does not test the hazard factors (acid value, benzopyrene, etc.). The factory adopts more advanced grinding equipment, which is more delicate than the domestic sesame paste. The separation phenomenon of oil and sauce after a long time is not serious, with only a separation of 3% after 3 months. During the preparation of Krotaj sesame paste, the temperature of fried seeds is 110°C. The flavor is delicate with a fresh sweetness and no strong aroma.

Selet Hulling organic sesame seeds are grown in the Northern region of Ethiopia and are hulled and cleaned at own processing facility in Addis Ababa. The sesame seeds are of the 't-85' or 'Humera' variety, known for its characteristic white color, large size and sweet, nutty taste and aroma. The factory consists of a raw material warehouse, sesame cleaning line, sesame dry-hulling line and a finished product warehouse with a total area of 2,200 m². The dry-hulling method of de-shelling the sesame seeds is practiced reducing the factory's water consumption and consequently lessen our impact on the environment.

Selet complies fully with the international organic rules and regulations such as EEC 834/2007, 889/2008 (EU), the NOP (US) and JAS (Japan), and has established optimum working relations with international organic certification bodies like Control Union. Selet also follows an integrated Internal Control System and works according to international quality systems like HACCP and ISO 22000. All products are fully traceable, from organic farms to our factory and finally to our customers. In cooperation with the TOC, testing of samples is performed in European accredited laboratories while intrinsic qualities are checked and controlled in Selet's own, well-equipped laboratory. This includes full control from the farm, transport of raw materials to our plant, storage, processing and shipment to our clients.

10.6 Market transaction

The sesame market organization of Ethiopia is mature and orderly. Through interviews with ECX headquarters, local transaction centers and warehouses, the delegation gained a clear understanding of the whole operation process of ECX.

10.6.1 Transaction mode of sesame market in Ethiopia

In November 2011, the Ethiopian government incorporated sesame into the management of ECX and implemented the auction trading system. At present, there are 23 ECX branches, 60 ECX warehouses and 347 members in Ethiopia. Three e-trading centers have been built, two will be added in 2020 and 2021 respectively, and seven e-trading centers will be built in total (Figure 10-9, Figure 10-10).

Farmers associations and enterprise farms can conduct domestic transactions through ECX. The general transaction process of ECX is as follows:



Figure 10-9 ECX trading place in Ethiopia

- (1) Sesame growers deliver the sesame gross products to the cooperative by production group.
- (2) The cooperative pays a deposit to sesame growers and collect the sesame products.
- (3) The cooperative deliver sesame gross products to ECX warehouse for storage, and ECX issues a delivery note (indicating the owner of the goods, license plate number, tonnage and number of bags in detail).
- (4) ECX sampling and testing classify the products into grades. The delegation reviewed the whole work-flow of commercial sesame grading in Humera ECX warehouse. ECX warehouse is rigorous and orderly from sampling to grading. It mainly tests the heterochromatic rate, impurity content, water content, etc. of commercial seeds, classifies them according to the heterochromatic rate and heterochromatic seed rate, and then registers them. The cooperative receives the registration number.
- (5) Within 45 days, the cooperative will auction in ECX e-trading center with its registration number. There is only 10 minutes of centralized trading time per day, and the system will automatically trade when the bid and asking price of both parties match.
- (6) The cooperative pays the final payment to the sesame growers and gives them an additional 15% subsidy (Figure 10-10).



Figure 10-10 ECX Humera warehouse

10.6.2 Sesame export trade model of Ethiopia

The main export channel of sesame in Ethiopia is also ECX. After the successful bidding on ECX platform, the exporter will arrange logistics to transport the sesame from ECX warehouse to his own factory for screening and processing, and then send it abroad after meeting the international quality standards.

In order to protect the interests of domestic sesame farmers and earn foreign exchange through export, the pricing of sesame by ECX is mainly based on the domestic sesame production cost. But the production cost of sesame is higher than that in the international market due to its low yield and high labor cost. In order to maintain the competitiveness and goodwill of sesame export, Ethiopian government has issued policies for regulation and control for many times. During the visit of the delegation, the government just issued a new ECX policy. The details are as follows:

- ① the Ministry of Industry and Trade issues international reference price to ECX trading platform every day;
- ② cancel ECX T+1 trading price $\pm 6\%$ limit, allowing the trading price of ECX to fluctuate freely according to the international reference price;
- ③ the export contract price of the exporter shall not be lower than the trading price obtained from the ECX auction. The exporter who violates this article will be banned from trading in ECX for two weeks, the second violation will lead to a longer ban of two months, and the third violation will disqualify the exporter from

exporting sesame; ④ the exporter must provide export cooperation to the bank, ECX, the customs for filing and verification; ⑤ for the exporters who break the contract in international trade, the sesame export qualification will be canceled. After the new policies came out, the export price of sesame in Ethiopia has been reduced, but it is still higher than that in other production regions.

Ethiopia's new policy allows farmers associations, enterprise farms and registered cooperatives to export directly, but foreign companies are not allowed to carry out sesame export trade business. If it is a foreign sesame processing enterprise, it is allowed to export its products on its own, but it is still not allowed to export raw sesame on its own.

10.7 Other relevant research

During its stay in Ethiopia, the delegation also visited the Economic and Commercial Counsellor's Office of the Chinese Embassy in Ethiopia and the Chinese agricultural expert group in Ethiopia, and organized a discussion among some Chinese investors who have already carried out agricultural production in Ethiopia. The Economic and Commercial Counsellor's Office expressed strong support for bilateral agricultural cooperation and was willing to fully mobilize relevant resources to support it. China's agricultural experts and senior expert groups have been working in Ethiopia for many years to assist local agriculture development. They have accumulated abundant experience and developed good knowledge on the soil, climate and other agricultural development conditions in Ethiopia, and they expressed their willingness to actively share and support in terms of techniques and technology. According to the Chinese agriculture experts, the cultivation of sesame in Ethiopia is mostly carried out in the rainy season. At this time, the soil is sticky, and the ploughing machinery needs strong hardness to be durable. In addition, the storage and maintenance conditions of agricultural machinery in Africa are poor, and the parts are easy to age due to the sun and rain in the open air, so the rubber parts that age easily should be used less. Chinese agricultural investors in Ethiopia shared their experience and lessons of agricultural production in Ethiopia, helping the delegation to better understand the potential and constraints of bilateral cooperation.

11 Analysis on the potential of Ethiopia-China sesame cooperation

In recent years, the demand for sesame in the international market is still on the rise, but strong international competitors continue to emerge. From the perspective of tapping the potential of cooperation between the two sides, this chapter summarizes the export competitiveness, main advantages and constraints of Ethiopian sesame, builds a cooperation model and discusses the direction of Ethiopia-China sesame cooperation.

11.1 Ethiopia's sesame export competitiveness

The main factor that Ethiopia sesame gradually loses its market in China in recent years is the high price^① (due to high production cost in the country) (Figure 11-1). In recent years, the price of sesame in Ethiopia has been at a high level compared with that in other production areas. As food sesame, its cost performance is weaker than that of Chinese sesame and Sudan sesame; as oil sesame, its cost performance is weaker than that of Tanzania, Mozambique and Uganda sesame. In recent years, due to cost advantages, the quantity of sesame export from Tanzania, Mozambique and Uganda has grown rapidly and surpassed that of the Ethiopia in the Chinese market.

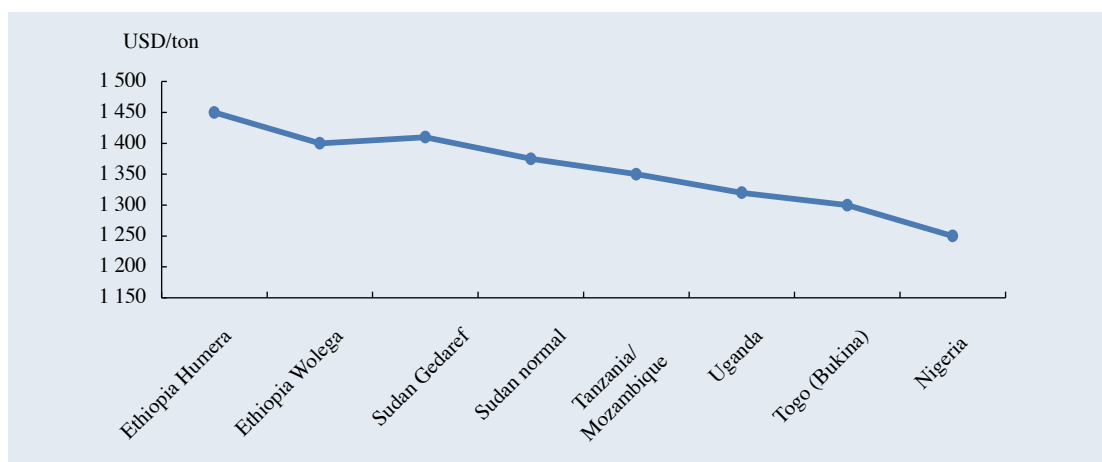


Figure 11-1 Global sesame price market

Data source: www.chinagrain.cn, query time May 9, 2020.

After ECX adjusted the trading rules in November 2019, the export price of sesame in Ethiopia maintained stable, but it was still in a high position compared with other products, and the cost performance disadvantage has not change fundamentally yet (Figure 11-2).

^① Ethiopian sesame's international trading price is pushing up since many companies have participated in Ethiopian sesame's international trade in exchange for foreign exchange. The Ethiopian government is actively promoting relevant reform measures. Since it is not a cost factor in the field of sesame production, it will not be discussed in this book.

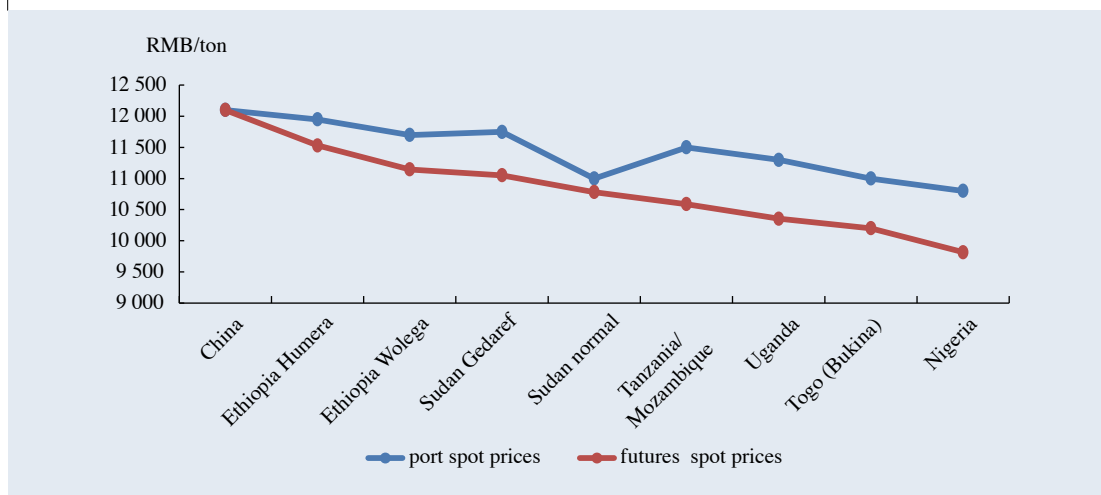


Figure 11-2 Comparison of global sesame futures and port spot prices

Data source: www.chinagrain.cn, query time May 9, 2020.

11.2 Main advantages of sesame industry value chain in Ethiopia

Firstly, the excellent sesame quality. Some areas of Ethiopia have unique natural conditions such as climate and soil suitable for sesame growth, and the quality of sesame produced is of high quality, the same quality as the top white sesame in China. Its granules are full and uniform, with good color, no heterogeneous granules, sweet taste, oil content as high as 51%-54%, and rich fragrance after baking. It is both superior food sesame and superior oil sesame. Among them, Humera white sesame in Ethiopia is mainly used to produce sesame paste, raw sesame confectionary and fried sesame; Gondar white sesame used for bakery and raw sesame; Wolega white sesame is mainly used to produce sesame oil and raw sesame.

Ethiopian white sesame's quality is widely praised in China's sesame market, and it is an essential raw material for many sesame oil factories and sesame paste factories. Some Chinese sesame processing plants have made flavor curing for products using Ethiopian sesame as raw materials, and have developed a stable customer base and market share. Therefore, for some plants, Ethiopian sesame is irreplaceable.

Secondly, the fundamental R&D system has been established. Ethiopia has established a research and development system consisting of the National Academy of Agricultural Sciences, the National Sesame Research Center, the Sesame Technology Guidance Station of the Ministry of Agriculture, and the Humara Agricultural Research Center. It has a certain scientific and technological foundation in sesame germplasm resources, variety improvement, agricultural mechanization equipment, etc.

Thirdly, mature production organization system. Under the guidance of the Ethiopian

government, various stakeholders of sesame value chain, such as smallholder farmers association, large-scale farm (company), agricultural machinery company, export association, ECX, ATA service center, sesame research center, as well as the Sesame Cultivation Technology Guidance Station of the Ministry of Agriculture, have joined up a highly organized industry value chain with a good foundation for large-scale production.

Fourthly, positive government action. The Ethiopian government attaches great importance to the development of sesame industry and has formulated a clear development strategy to develop the sesame industry cluster, establish agro-industrial parks, expand areas suitable for sesame cultivation, improve ECX trading rules, and actively create a good business environment to attract foreign investment.

11.3 Constraints of sesame value chain in Ethiopia

On the basis of the constraints listed in Chapter 1, the delegation focused on analyzing the constraints in unit yield, cultivation cost and processing links from the perspective of bilateral cooperation.

First, sesame yield per unit area in Ethiopia has not yet fully tapped into its potential. According to the investigation in the main production areas, the small area experiment yield can reach 800-1,100 kg/ha, and the field yield is 400-600 kg/ha. In 2018, FAO's statistics shows yield as 726 kg/ha, which is higher than the world average level of 512 kg/ha, and also higher than other major sesame producing countries in Africa. However, compared with 1,645kg/ha in China, there is still a lot of room for improvement.

The sesame breeding techniques in Ethiopia is still at a primary stage. China's practical experience shows that the contribution rate of using excellent sesame varieties to the yield can reach more than 40%. Ethiopia has a relatively large sesame cultivation scale, but the scientific research investment and R&D capacity in the cultivation field are seriously insufficient. Current sesame resource cultivation observation and pedigree selection are superficial observations, and the varieties cultivated are low in yield and poor in resistance. The sesame breeding personnel have little knowledge of conventional hybrid breeding technique and molecular breeding technique.

There is huge room for improvement in sesame field cultivation techniques and management in Ethiopia. Ethiopia has done experiments on the application of chemical fertilizer to improve the yield, but there is a lack of test results on the type, quantity and proportion of fertilizer and the related R&D of high-yield cultivation technology, fertilizer and water management technology, disease and weed drought prevention and control technology, etc., thus there is also a lack of the application of related agricultural technology in the field production. In addition, pesticides, fertilizers and other inputs are very limited; the crop is vulnerable to disasters, e.g., it will suffer a significant yield reduction in case as drought.

Second, the sesame production labor cost is high, and few machines are applied. In Ethiopia, there are two models of production: pure manual operation and partial mechanized operation. While smallholder farmers basically adopt pure manual operation model, large farms use mechanical land preparation but basically use manual model for other links. The links of seeding, weeding and harvesting need a great amount of manpower, especially the large-area harvest, which is seasonal and needs to attract a large number of workers from other regions in a short time. The farms have to compete for labor, resulting in the rise of labor price. Ethiopia has preliminarily made the machine seeding test in sesame mechanization production technology and agricultural machinery equipment R&D, with good results achieved, but due to the lack of seeders, mechanization cannot be widely promoted. Some large farms have been equipped with sound mechanization foundations, and machinery has been applied in land preparation, etc., but most other links lack appropriate agricultural machinery.

11.4 Ethiopia-China sesame value chain cooperation potential

One of the core difficulties of Ethiopia's sesame industry is that low unit yield and high production cost lead to its high export price. In order to give full play to the comparative advantages and development potential of sesame production in Ethiopia, it is urgent to improve the unit yield and reduce the production cost to enhance the competitiveness of sesame export, and increase the export earnings and the income of sesame farmers. China has the world's largest sesame import demand, advanced sesame variety R&D and mechanized production technology. Based on the data obtained from the field survey, here construct a Sesame Cooperation Model under different assumptions.

11.4.1 Cooperation model in production

Hypothesis 1: the sesame cultivated area of the farm is 1,000 hectares, and the main expenditure includes the purchase of seeds, tractor-ploughing, seeding labor, weeding labor, and harvesting labor (other agricultural machinery, pesticides, fertilizers, etc. are not included).

Hypothesis 2: based on the field research, the farm unit yield is 400-600 kg/ha, assuming that the yield per hectare of sesame is 500 kg.

Hypothesis 3: the selling price of each ton of sesame is 42,000 birr/ton in November 2019, and the exchange rate for US dollar was 29:1 at that time, which was about 1,448 US dollars/ton.

Based on the above hypotheses and relevant data collected in field research, the basic model is shown in the table below. The total revenue of 1,000 ha sesame farm is 724 thousand USD, and the gross revenue of farm is 308 thousand USD. The main cost is 416 USD/ha, equivalent to revenue of 308 USD/ha or 616 USD/ton (Table 11-1).

Table 11-1 Ethiopia's sesame production cost and benefit base model

	Category	Item no.	Description	Sub total	Unit	Price	Unit	Amount (birr)
Cost (in birr)	Seed	1	Machine seeding: 1.8-2.1kg/ha; 300ha	6,200	kg	50	birr/kg	310,000
		2	Manual seeding: 4-12kg/ha, 700ha, about 5,600kg					
	Machine ploughing	3	2,500 birr/ha	1,000	ha	2,500	birr/ha	2,500,000
	Seeding labor	4	51 people in total	51	man-day	100	birr/man-day	5,100
	Weeding and thinning labor	5	19 person days / ha	19,000	man-day	100	birr/man-day	1,900,000
	Harvest labor	6	Harvest will take 4 persons to work 7 days to harvest 1 hectare; Harvest at the same time will take 3,500 people to work 7 days, totaling 24,500 man-days	24,500	man-day	300	birr/man-day plus per piece price	7,350,000
	Primary inputs	7	Total revenue (=1+2+3+4+5+6)					12,065,100
	Per hectare inputs	8	Cost per ha (=“7”/1,000)	1,000	ha		birr	12,065
	Per ton	9	Cost per ton (0.5 tons per hectare in yield) (=“8”*2)				birr	24,130
Revenue (in birr)	Total revenue per hectare	10	500 kg sesame per hectare, 42,000 birr/ton	500	kg /ha	42	birr/kg	21,000
	Gross revenue per hectare	11	Gross revenue per hectare		ha		birr	8,935
	Farm total revenue	12					birr	21,000,000
	Farm gross revenue	13					birr	8,935,000
Calculated by area (in USD)	Total revenue per ha	14	=“10”/29				USD	724
	Cost per ha	15	=“8”/29				USD	416
	Gross revenue per ha	16	=“14”-“15”				USD	308
Calculated by quantity (in USD)	Total revenue per ton	17	Selling price 42,000birr/ton				USD	1,448
	Cost per ton	18	=“9”/29				USD	832
	Gross revenue per ton	19	=“17”-“18”				USD	616
Calculated by farm (in USD)	Total revenue	20	=“14”*1,000				USD	724,138
	Main cost	21	=“15”*1,000				USD	416,038
	Gross revenue	22	=“16”*1,000				USD	308,100

Based on this model, through the sesame industry value chain cooperation between China and Ethiopia, corresponding results can be achieved. The calculation is as follows.

Hypothesis 4: Through variety improvement cooperation, the two sides jointly develop varieties that are suitable for growth on barren land and are disease and insect resistant, and also conduct field management technique cooperation, so as to increase the unit yield by 20%, i.e., item 10 “unit yield” in the model reaches 600 kg/ha.

Put Hypothesis 4 into the model for calculation, then the cost per ha of the sesame farm is still 416 USD/ha, but the cost per ton dropped by 16.7%, as the gross revenue of the farm is 453 thousand USD is after yield increase, a 47% increase over the original model, equivalent to 755 USD in gross revenue per ton, a 22.6% rise over the original model (Table 11-2).

Table 11-2 Ethiopia sesame production cost and benefit model (Assuming unit yield increase)

Hypothesis	Category	Unit	Amount	Base model amount	Variance
Hypothesis 4 Increase unit yield by 20% to 600 kg/ha	Total revenue per ha	USD/ha	869	724	20.0%
	Cost per ha	USD/ha	416	416	0.0%
	Gross revenue per ha	USD/ha	453	308	47.1%
	Total revenue per ton	USD/ton	1,448	1,448	0.0%
	Cost per ton	USD/ton	693	832	-16.7%
	Gross revenue per ton	USD/ton	755	616	22.6%
	Farm total revenue	USD	868,966	724,138	20.0%
	Farm total cost	USD	416,038	416,038	0.0%
	Farm gross revenue	USD	452,928	308,100	47.0%

Hypothesis 5: Through the cooperation on sesame mechanization R&D and application, the labor input cost in the harvest season, i.e., item 6 in the model, is reduced by 20%.

Put Hypothesis 5 into the model for calculation, then the farm total revenue is still 724 USD. The cost per ha is reduced to 365 USD/ha. The gross revenue of farm is 359 thousand USD, a 16.6% increase over the original model, equivalent to 718 USD in gross revenue per ton, a 16.5% increase over the original model (Table 11-3).

Hypothesis 6: Through cooperation on science and technology, field management and sesame field mechanization R&D and application, a unit yield increases by 20% to 600 kg, and a labor input reduces by 20% in harvest season, both achieved at the same time.

Put Hypothesis 6 into the model for calculation, then the farm gross revenue is 504 thousand USD, a 63.5% increase over the original model, equivalent to 839 USD in gross revenue per ton, a 36.2% increase over the original model (Table 11-4).

Table 11-3 Ethiopia sesame production cost and benefit model (Assuming cost reduction)

Hypothesis	Category	Unit	Amount	Base model amount	Variance
Hypothesis 5 Using agricultural machinery to reduce harvesting labor by 20%	Total revenue per ha	USD/ha	724	724	0.0%
	Cost per ha	USD/ha	365	416	-12.3%
	Gross revenue per ha	USD/ha	359	308	16.6%
	Total revenue per ton	USD/ton	1,448	1,448	0.0%
	Cost per ton	USD/ton	731	832	-12.1%
	Gross revenue per ton	USD/ton	718	616	16.6%
	Farm total revenue	USD	724,138	724,138	0.0%
	Farm total cost	USD	365,348	416,038	-12.2%
	Farm gross revenue	USD	358,790	308,100	16.5%

Table 11-4 Ethiopia sesame production cost and benefit model (Assuming yield increase and cost reduction)

Hypothesis	Category	Unit	Amount	Base model amount	Variance
Hypothesis 6 Unit yield increases by 20% to 600 kg/ha, and use of agricultural machinery reducing harvesting labor by 20%	Total revenue per ha	USD/ha	869	724	20.0%
	Cost per ha	USD/ha	365	416	-12.3%
	Gross revenue per ha	USD/ha	504	308	63.6%
	Total revenue per ton	USD/ton	1,448	1,448	0.0%
	Cost per ton	USD/ton	609	832	-26.8%
	Gross revenue per ton	USD/ton	839	616	36.2%
	Farm total revenue	USD	868,966	724,138	20.0%
	Farm total cost	USD	365,348	416,038	-12.2%
	Farm gross revenue	USD	503,617	308,100	63.5%

Hypothesis 7: Multiple measures applied together. Through cooperation on science and technology, field management, sesame field mechanization R&D and application, the unit yield increases by 20% to 600 kg, and the labor input during harvest reduces by 20%; in addition, in order to raise the competitiveness in the global market, the price reduces by 15% to 36,000 birr/ton (item 10 price change was 36 birr/kg in the original model), equivalent to about 1,231 USD/ton, which is the same as the lowest price in the global market in the same period.

Put Hypothesis 7 into the model for calculation, then the main cost of is 365 USD/ha, a 12.3 drop over the original model. The gross revenue of the farm is 379 thousand USD, an increase of 23.2% over the original model, equivalent to 839 USD/ha in revenue, an increase of 2.7% over the original model (Table 11-5).

Based on the above analysis, it can be concluded that through the cooperation of both sides, that the goal of either improving unit yield or realizing agricultural machinery application is realized can play a positive role. If both goals are achieved, even if the sesame price is reduced by 15%, the farm's income will still increase by more than 20% compared to the current revenue. By then, with the sesame price equal to that of the global market and with the good quality, Ethiopian

sesame's global competitiveness can be significantly improved.

Table 11-5 Ethiopia sesame production cost and revenue model

(Assuming yield increase, cost reduction and selling price reduction)

Hypothesis	Category	Unit	Amount	Base model amount	Variance
Hypothesis 7 Unit yield increases by 20% to 600 kg/ha, use of agricultural machinery reducing harvesting labor by 20%, and the unit price decreases by 15%	Total revenue per ha	USD/ha	745	724	2.9%
	Cost per ha	USD/ha	365	416	-12.3%
	Gross revenue per ha	USD/ha	379	308	23.1%
	Total revenue per ton	USD/ton	1,241	1,448	-14.3%
	Cost per ton	USD/ton	609	832	-26.8%
	Gross revenue per ton	USD/ton	632	616	2.6%
	Farm total revenue	USD	744,828	724,138	2.9%
	Farm total cost	USD	365,348	416,038	-12.2%
	Farm gross revenue	USD	379,479	308,100	23.2%

It should be noted that the cost-revenue model is a simplified model with several assumptions. The model has at least the following limitations: ① some input costs such as agricultural machinery purchase and agricultural machinery operation are not included, the quantity and unit price are not set in different situations, and the variable exchange rate is not used. ② The proportion of increasing per unit yield and reducing cost through cooperation may be quite different from the hypothesis. For example, according to the estimation of experts, if the high-yield varieties suitable for Ethiopia are adopted, the yield is expected to be at least 700 kg/ha; if mechanized production is adopted in the main links of sowing, weeding and harvesting, the cost can be reduced by more than 30%. Therefore, this model is only for reference.

11.4.2 Cooperation in sesame deep processing needs to wait for the right time

The cooperation in construction of sesame oil processing plant has not met the investment expectation (Table 11-6). The price of sesame raw materials is relatively high. Taken 42 birr/kg as the calculation standard, there is no cost advantage in the production of sesame crude oil for export to China. If the five-year average raw material price or the reduced raw materials cost, in assumption, reaches 29 birr/kg, investment opportunities will arise.

Assuming that through cooperation in technology and field management, sesame mechanization R&D and application, the yield per unit area is increased to 700 kg, and the labor input in harvest season is reduced by 20%. If the selling price falls to the balance price of 29,000 birr/ton (the price change of item 10 in the original model is 29 birr/kg), equivalent to about 1,000 USD/ton, reaching the raw material price in Table 11-4, and thus the profit reaches that in Table 11-5. At this time, the net income of the farm is 334 thousand US dollars, which is still 8.6% higher than the original model.

Table 11-6 Feasibility calculation of Chinese funded new sesame oil processing plant in Ethiopia

Project	Value	Wolega or Humera grade II (based on current raw material price)		Wolega or Humera grade II (based on five-year average raw material price)	
Purchase price of oil plant raw materials (birr/kg)		42		29	
Transportation fee (birr/kg)					
Total cost from raw material to plant (birr/ton)		42,000		28,613	
Unloading (birr/ton)	12.50	13		13	
Labor cost of upper cleaning equipment (birr/ton)		0		0	
Impurity removal (birr/ton)		1,050		858	
Total cost of finished products (birr)		43,063		29,484	
Project	Value	Crude oil	Sesame cake	Crude oil	Sesame cake
Finished products ex-factory cost (birr/ton)		100,134	7,185	69,620	7,185
Factory reasonable net profit	12.0%	12,016	862	8,354	862
Factory price of finished products (birr/ton)		112,150	8,047	77,975	8,047
Cost of finished products at Djibouti port (birr/ton)		114,127	10,023	79,951	10,023
CIF Wuhu port (RMB)	7.07	27,992	2,549	19,639	2,549
Crude oil cost to sesame oil plant in China (RMB)		30,937	3,154	21,771	3,154
Sesame crude oil price in China (RMB/ton)		25,900	3,100	23,260	3,100
Production cost advantage of Ethiopia (RMB/ton)		−5,037	−54	1,489	−54

Data source: calculation done by experts from the Chinese delegation.

Table 11-7 Feasibility calculation of Chinese funded new sesame oil processing plant in Ethiopia

Hypothesis	Category	Unit	Amount	Base model amount	Variance
Hypothesis 7 Unit yield increases by 20% to 700 kg/ha, use of agricultural machinery reducing harvesting labor by 20%, and the unit price decreases by 15%	Total revenue per ha	USD/ha	700	724	-3.3%
	Cost per ha	USD/ha	365	416	-12.3%
	Gross revenue per ha	USD/ha	335	308	8.8%
	Total revenue per ton	USD/ton	1,000	1,448	-30.9%
	Cost per ton	USD/ton	522	832	-37.3%
	Gross revenue per ton	USD/ton	478	616	-22.4%
	Farm total revenue	USD	700,000	724,138	-3.33%
	Farm total cost	USD	365,348	416,038	-12.2%
	Farm gross revenue	USD	334,652	308,100	8.6%

12 Cooperation proposal

Sesame is one of the most important crops for foreign exchange in Ethiopia, while China's import of sesame accounts for 47% of the global sesame trade volume. Although China is not the largest importer of Ethiopian sesame in recent two years, Ethiopian sesame remains an indispensable variety in China's market.

There is a broad prospect for both sides to strengthen and expand an all-round cooperation in sesame value chain. Ethiopia has natural high-quality sesame, vast land resources suitable for sesame cultivation and abundant young and hardworking workers; China has advanced sesame production technology, huge sesame demand and active and diligent entrepreneur resources. Cooperation between the two countries will help to promote the increase of sesame unit yield, reduce production costs, and enhance the sesame yield and global competitiveness of Ethiopia, while the Chinese market can obtain sufficient, stable and high-quality sesame supply.

During communications with the main stakeholders in the sesame value chain of Ethiopia, the delegation felt strongly their keen hope to strengthen cooperation with Chinese scientific research institutions and enterprises. After having sufficient communication, the two sides reached cooperation consensus on sesame variety improvement, mechanization technology and production by order.

12.1 Cooperation target

The two sides will be committed to promoting the sesame industry value chain upgrade in Ethiopia, to add new momentum to the technology level and sesame yield improvement in Ethiopia and to earn foreign exchange through export, to provide high-quality raw materials for China and other sesame importing countries, and to promote China and Ethiopia to play a more active role in the global sesame industry value chain, thus complementing each other.

12.2 Cooperation vision

Through various forms of cooperation, we shall share the development experience of China's sesame industry value chain, jointly carry out variety research and development, agricultural machinery and equipment research and development, share agronomic measures, strengthen direct exchanges of bilateral supply and demand markets, and build a full value chain cooperation model.

12.3 Cooperation initiatives

First, to establish cooperation mechanism. On the government level, it is suggested to

build a bilateral government technology cooperation mechanism; on the private sector level, it is suggested to establish a “global alliance of China-Ethiopia sesame value chain”. We should form a cooperation mechanism for cross-border cooperation in scientific research, seed industry, processing, cultivation, trade and government between the two countries, discuss the development plan of Ethiopia-China sesame value chain together, and promote the extension and development of sesame value chain of the two countries, helping the two sides to complement each other and achieve win-win results.

Second, to start sesame variety improvement cooperation. To speed up the improvement and renewal of sesame varieties in Ethiopia is the essential solution to realise a revolutionary leap in yield and production. Scientific research institutions of the two sides are conducting joint R&D around key scientific and technological issues in the main production areas of sesame in Ethiopia, screening and breeding of new sesame varieties with high-yield, high oil content, high protein content, high sesamin, drought resistance, disease resistance, pest resistance and barren resistance and suitable for mechanization, and share the intellectual property rights and interests. Specific cooperation methods include China sending high-level experts to provide support to Ethiopian experts to carry out aggregate breeding and molecular breeding, Ethiopia introducing well-performing varieties from China for trial cultivation, building joint laboratories for sesame genetic improvement (relying on National Academy of Agricultural Sciences of Ethiopia or Humera Agricultural Research Center), Ethiopian sesame experts coming to study in China, etc. National level sesame technology and research institutions of the two countries may sign the memorandum of comprehensive cooperation on sesame science and technology to define the cooperation content and implement the cooperation plan.

Third, to start sesame mechanized production technology and agricultural machinery cooperation. China shall send Chinese scientific research experts and agricultural machinery enterprise technicians to provide agricultural machinery prototypes, conduct joint research, development and application with Ethiopian agricultural machinery scientific research and technical personnel, and to share intellectual property rights and interests. Second, carry out demonstration and popularization of new mechanization technology in R&D base of Ethiopian Academy of Agricultural Sciences or large-scale sesame cultivation farm. Third, Ethiopia may send technicians to China for observation and study.

Fourth, to develop sesame contract farm cooperation. In order to develop the *sesame contract farm*, Chinese sesame processing enterprises, sesame breeding expert team and the agricultural companies set up a consortium to cooperate with large farms in Ethiopia on “contract” initiatives.

Based on the contract farm cooperation, bring technology cooperation into the sesame farms in Ethiopia, plant high-yield, high-quality sesame varieties suitable for mechanization, develop

the whole-process mechanized production model, and strengthen the scientific management of fertilizer and water to improve the yield and quality, reduce the production cost, stabilize the supply of sesame, and establish the long-term mutually-beneficial cooperation. **Establish a price stabilization mechanism.** A pricing model acceptable to both parties shall be adopted. For example, Chinese processing enterprises and large enterprise farms in Ethiopia may sign an annual purchase contract. The contract price shall be set according to the average price of the previous five years, and a price adjustment mechanism of $\pm 10\%$ shall be set. When the difference between the market price and the contract price is greater than 10%, the price will be adjusted by 5%. Under this price stabilization mechanism, both sides can effectively avoid the loss and unfairness caused by the sharp fluctuation of market price, which is conducive to the establishment of a long-term and stable cooperation relationship, gradually forming scale advantage, and a good foundation for the gradual establishment of sesame full value chain cooperation.

Fifth, to seek support from multiple resources. Seek financial and technical support from organizations and institutions such as Melinda Gates Foundation, World Bank, United Nations International Trade Center, the Alliance for a Green Revolution in Africa (AGRA), and bilateral development and cooperation.

12.4 Suggestions and prospects

First, it is suggested that the Ethiopian government should increase investment in the construction of sesame agricultural infrastructure, design more attractive preferential policies for agricultural investment, and actively introduce international sesame agricultural technologies.

Second, it is suggested that the Ethiopian government should further follow the market rules, establish a more free and open market, increase the opportunities for enterprise farms and cooperatives to directly carry out export cooperation, and reduce the restrictions on foreign companies' participation in acquisition and export.

Third, it is suggested that the Ethiopian government should strengthen its investment in technology R&D of sesame value chain in Ethiopia, integrate and supplement the imported international sesame technology, and promote the improvement of sesame value chain in Ethiopia through innovation and industry-academy research integration.

Annex 1 A comprehensive list of incentives applicable for industrial park developers

1 fiscal incentives

#	Incentive Summary	Reference	Reference Text								
1	Duration of corporate income tax holiday:	(a) Investment Incentives and Investment Areas Reserved for Domestic Investors Council of Ministers Regulation No. 270/2012 (as amended by Investment Incentives and Investment Areas Reserved for Domestic Investors Council of Ministers (Amendment) Regulation No. 312/2014) (the "Investment Regulations") , Item No. 21 of the Schedule Attached.	(a) SCHEDULE INVESTMENT AREAS AND INCOME TAX EXEMPTIONS <table><tr><th>No.</th><th>Investment Areas</th><th>In Addis Ababa or in a Special Zone of Oromia surrounding Addis Ababa</th><th>In Other Areas</th></tr><tr><td>1</td><td>1.21 Industrial development zone (including private industrial development zone investment, the establishment of which is agreed with the government prior to the issuance of the [Investment] Proclamation)</td><td>Exemption from income tax for 10 years</td><td>Exemption from income tax for 15 years</td></tr></table> <i>Note: Currently, the area reserved for IP is located at a land designated as Other Areas, so the IP developer will be entitled to a 15 years income tax exemption.</i> (b) 7. Additional Income Tax Exemption for Investors Exporting Products or Services 1) Any investor who exports or supplies to an exporter as production or service input, at 60% of his products or services shall be entitled to income tax exemption for two years in addition to the exemption provided for in the Schedule attached hereto. 2) An investor who has invested within an industrial development zone shall be entitled, in addition to what is provided for in sub-article (1) of this Article and the Schedule attached hereto, to 2 years income tax exemption if the investment is made in an industrial zone located in Addis Ababa or Special Zone of Oromia surrounding Addis Ababa or to 4 years income tax exemption if the investment is made in an industrial zone located in other areas, provided that he exports 80% or above of the product from his manufacturing industry or supplies as production input to an investor who exports his products. 3) An investor who has invested or is to invest within private industrial development zone, the establishment of which is agreed with the Government prior to the issuance of the [Investment] Proclamation, shall be entitled to the incentive provided for in sub-article (2) of this Article upon fulfilling the preconditions stipulated therein. <i>Note: The incentive under this Article 7 of the Investment Regulations is available for investors who made their investment within an IP. So, while the above 10/15 years income tax exemption is for the IP developers, this one is for those actual investors who made investment within an IP, otherwise referred as" industrial park enterprise" by the Industrial Parks Council of Ministers Regulations No. 417/2017 (the' Industrial Parks Regulations')).</i>	No.	Investment Areas	In Addis Ababa or in a Special Zone of Oromia surrounding Addis Ababa	In Other Areas	1	1.21 Industrial development zone (including private industrial development zone investment, the establishment of which is agreed with the government prior to the issuance of the [Investment] Proclamation)	Exemption from income tax for 10 years	Exemption from income tax for 15 years
	No.	Investment Areas		In Addis Ababa or in a Special Zone of Oromia surrounding Addis Ababa	In Other Areas						
	1	1.21 Industrial development zone (including private industrial development zone investment, the establishment of which is agreed with the government prior to the issuance of the [Investment] Proclamation)		Exemption from income tax for 10 years	Exemption from income tax for 15 years						
	(a) For industrial park developers 15 years of tax exemption from the date of issuance of business license.										
	(b) For industrial park enterprises, specific sector income tax exemptions up to 6 years. In addition, 2 years income tax exemption if 60% of the product is exported or supplied as production input for exporters and additional 4 years income tax exemption if the industrial park enterprise exports or supplies as production input to exporters 80% of its product.	(b) The Investment Regulations, Article 7 and the Schedule attached.									
<i>Note: an industrial park enterprise (as defined in the Industrial Park Proclamation) simply means those investors who made investment within an industrial park ("IP") to engage in manufacturing activity or service provision.</i>											

(Continued)

#	Incentive Summary	Reference	Reference Text
2	Income tax exemption for expatriate employees: for 5 years from the date of issuance of business license. <i>Note: For Enterprise only (i.e., not for a Developer)</i>	The Industrial Parks Regulations, Article 34.	34. Exemption from Tax on Salary Foreign nationals employed by an industrial park enterprise that has undertaken to export its produce shall be exempted from paying income tax on their salary during five consecutive years starting from the date on which the enterprise obtained business license.
3	Loss carry forward: Carry forward of losses incurred during tax exemption period for 5 income tax periods.	The Investment Regulations, Article 12.	12. Loss Carry Forward 1) An investor who has incurred loss within the period of income tax exemption shall be allowed to forward such loss for half of the income tax exemption period after the expiry of such period. 2) Notwithstanding the provisions of sub-article (1) of this Article, for the purpose of calculating the period of loss carry forward, a half-year period shall be considered as a full-time income tax period. 3) Notwithstanding the provisions of sub-article (1) and (2) of this Article, an investor who has incurred loss during the income tax exemption period may not allowed to carry such loss for more than five income tax period. <i>Note: So, in this regard the IP developer will be eligible to carry losses forward for a 5 income tax periods after the expiry of the 15 income tax exemption periods.</i>
4	Customs duty exemption on capital goods, construction materials, accessories and spare parts, and vehicles.	The Investment Regulations, Article 13 (1 & 2). Ethiopian Investment Board Industrial Parks Directive No. 06/2017, Article 10 (2) read together Article 10 (1) (h) ; Article 40 (for an Enterprise) (the "Industrial Parks Directive").	The Investment Regulations 13. Exemption of Capital Goods and Construction Materials from Customs Duty 1) Any investor engaged in one of the areas of investment specified in the Schedule attached hereto, except those specified under numbers 7, 11, 14 and 15 of the Schedule, may import duty-free capital goods and construction materials necessary for the establishment of a new enterprise or the expansion or upgrading of an existing enterprise. 2) For the implementation of sub-article (1) of this Article, the investor shall submit, in advance, the list of capital goods and construction materials to be imported duty-free and get approval of same from the appropriate investment organ. The Industrial Parks Directive 10) Particulars of Industrial Park Developer Agreement and Customs Duty and Tax Exemption 1) The agreement the [Ethiopian Investment] Commission concludes with an industrial park developer shall at least contain: a) the purpose or subject matter of the agreement;

(Continued)

#	Incentive Summary	Reference	Reference Text
4	Customs duty exemption on capital goods, construction materials, accessories and spare parts, and vehicles.	The Investment Regulations, Article 13 (1 & 2). Ethiopian Investment Board Industrial Parks Directive No. 06/2017, Article 10 (2) read together Article 10 (1) (h) ; Article 40 (for an Enterprise) (the "Industrial Parks Directive").	b) the exact geographical boundaries of the land to be developed; c) financial, social and environmental protection obligations; d) time-frame for construction performance including commencement and completion of project construction; e) provisions that prevent use of land for unintended purpose as well as transfer of undeveloped land; f) methods of ensuring the safety of the perimeter of the construction; g) standards and time limit for the construction of temporary dormitories for workers' cafeterias and offices made in the course of park development; h) list of items to be imported free from customs duty and tax: ■ infrastructure (road, electric power, telecom, water, liquid waste disposal, logistics, security, fire accident prevention and related infrastructure construction machinery and materials) ; ■ building construction designs and necessary construction materials; ■ capital goods; ■ accessories; ■ spare parts; ■ software; ■ motor vehicles permitted in accordance with a directive or the Ethiopian Investment Board; ■ personal effects; ■ raw materials; ■ consumable laboratory and design materials; ■ safety and health related materials such as medicines which are regarded as necessary and issued to workers for free; [and] ■ containers used to pack and import various goods. i) Any other rights and obligations not expressly stipulated for contracting parties in the [Industrial Parks Proclamation No. 886/2015], the [Industrial Parks] Regulations, in this Directive or other relevant laws. 2) The [Ethiopian Investment] Commission shall grant an industrial park developer to import goods free from customs duty and tax in accordance with the list indicated in sub-article 1 (h) of this Article. 40) Conditions for the Supply of Spare Parts and Replacement Accessories to Machinery 1) A domestic of foreign investor may hold stocks of spare parts and replacement accessories to machinery and supply the same to industrial park enterprises free from customs duty and taxes; however, appropriate customs duty and tax shall be paid in accordance with relevant laws where the investor sells spare parts and replacement accessories to machinery to a manufacturing enterprise located outside an industrial park. 2) Stocks of spare parts and replacement accessories to machinery under sub-article ① of this Article shall be kept only in a bonded warehouse located within an industrial park controlled jointly by the enterprise and the [Ministry of Revenue].

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#	Incentive Summary	Reference	Reference Text
5	Exemption from customs duties on imported vehicles (2 SUVs and 3 hybrid SUV / hybrid automobile vehicles).	The Investment Regulations, Article 14	<u>The Investment Regulations</u>
		Consolidated Ethiopian Investment Board Directives, September 2017 (the “Consolidated Board Directives”), Section 8.	14. Exemption of Motor Vehicles from Customs Duties The total or partial exemptions of motor vehicles from customs duties shall be determined by directive to be issued by the [Ethiopian Investment] Board based on the types of and nature of investment projects. The Consolidated Board Directives (translation by legal counsel from the original Amharic version) 8. Importation of Duty-Free Motor Vehicles By Investors Within Industrial Parks The Board has decided for: 8.1 industrial park developers as well as industrial park enterprises (including medium and small / entities below two hundred million Birr) to be able to import two SUV (Land Cruiser or other brands) motor vehicles under the ownership of the developer/enterprise free from customs duty; and 8.2 industrial park developers as well as industrial park enterprises (including medium and small / entities below two hundred million Birr) to be able to import three HYBRID SUV like motor vehicles under the ownership of the developer / enterprise free from customs duty, (because it comes to knowledge that the technology has not started to manufacture HYBRID SUV at the date of the Board’s decision, HYBRID AUTOMOBILE may be regarded with the [HYBRID SUV] standard).

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#	Incentive Summary	Reference	Reference Text
6	Subject to fulfilment of prescribed conditions under the law, different duty incentive schemes are available with regards to import of raw material for commercial production	The Export Trade Duty Incentive Schemes Proclamation No. 768/2012, Articles 5/1, 10/2, 12/1, 16/1, 18/1, and 14/1.	a)
	a) duty draw-scheme;		5. Duty Draw-Back
	b) voucher scheme;		1) Duty paid on goods imported or purchased locally by [commodity exporters or suppliers to commodity exporters] shall be refunded to them upon fulfilment of conditions laid down in directive to be issued by the Ministry of Finance.
	c) bonded export factory scheme;		b)
	d) bonded export manufacturing warehouse scheme;		10. Procedure for the Application of Voucher Scheme
	e) bonded input supplies warehouse scheme; and		2) [Commodity exporters or suppliers to commodity exporters [have obtained certificate of eligibility from the Ministry of Trade and Industry] shall be entitled to take delivery of goods they import, upon the entry in the voucher book of the amount of duty payable on such goods.
6	f) industrial zone scheme		c)
	<i>Note: Please note that as developers and enterprises are generally exempt from customs duty, these provisions are applicable in exceptional cases where such developers or exporters may be obliged to pay customs duty.</i>		12. Procedure for the Application of Bonded Export Factory Scheme
			1) Raw materials imported by a person who have [engaged exclusively in the production of export commodities, obtained certificate of eligibility from the Ministry of Trade and Industry, and who have a manufacturing plant which meets the standards set by the Ministry of Revenues] shall be transported to the factory under the control of customs without being subject to payment of duty.
			d)
			16. Procedure for the Application of Bonded Export Manufacturing Warehouse Scheme
			1) Raw materials imported by [producers who are engaged exclusively in production of export commodity, have obtained certificate of eligibility from the Ministry of Trade and Industry, and have manufacturing warehouses which meet the standards set by the Ministry of Revenues] shall be transported to the manufacturing warehouse under the control of customs without being subject to payment of duty.
			e)
			18. Procedure for the Application of Bonded Input Supplies Warehouse Scheme
			1) Input supplies imported by [persons who have obtained certificate of eligibility from the Ministry of Trade and Industry and who have warehouses meeting the standards set by the Ministry of Revenues] shall be transported from a customs post to such warehouses under the control of customs without being subject to payment of duty.
			f)
			14. Procedure for the Application of the Scheme
			1) Raw materials imported by a person who is beneficiary of the industrial [park] scheme shall be transported from a customs post to the factory under the control of customs without being subject to payment of duty.

2 NON- FISCAL INCENTIVES

#	Incentive Summary	Reference	Reference Text
1	The right to make the following remittances out of Ethiopia in convertible foreign currency: - Profits and dividends; - Principals and interest payments on external loans; - Payment related to a registered technology transfer agreement, if any; - Proceeds from the sale, capital reduction, or liquidation of an enterprise; - Compensation paid to an investor pursuant to expropriation laws; and - Proceeds from the sale or transfer of shares or partial ownership of an enterprise to another investor. A foreign investor is availed with foreign currency: a) on priority basis to repatriate its profits and dividends; and proceeds from the sale or liquidation of an enterprise as well as compensation paid; and (b) on demand, without the requirement of registration, to pay principals and interest payments on external loans and suppliers' credits. Expatriate employees are also availed with foreign currency on demand to transfer their employment salaries. Manufacturers are also given priority to access foreign currency to procure machineries, equipment, spare parts, raw materials and accessories.	The Investment Proclamation No. 1180/2020 (the Investment Proclamation), Article 20. The Industrial Parks Proclamation No. 886/2015 (the "Industrial Parks Proclamation"), Article 21 Transparency in Foreign Currency Allocation and Foreign Exchange Management Directives No. FXD/46/2017 (the "Transparency in Foreign Currency Directive"), Article 6.	The Investment Proclamation 20. Remittance of Funds - Any foreign investor shall have the right, in respect of his investment, to remit the following payments and earnings out of Ethiopia in convertible foreign currency at the prevailing exchange rate on the date of transfer: - Profits and dividends accruing from his investment; - Principal and interest payments on external loans; - Payment related to technology transfer agreement registered in accordance with Article 15 of this Proclamation [Technology Transfer Agreement]; - Payments related to collaboration agreement registered in accordance with Article 16 of this Proclamation [Foreign Enterprise Collaboration Agreement for Export Trade Without Capital Contribution]; - Proceeds from the transfer of shares or conferral of partial or total ownership of an enterprise to another investor; - Proceeds from the sale, capital reduction or liquidation of an enterprise; and - Compensation paid to an investor pursuant to Sub-article (2) of Article 19 of this Proclamation. - Notwithstanding the provision of Sub-article (1) of this Article, a domestic investor investing jointly with a foreign investor shall not be allowed to remit funds earned from the investment out of Ethiopia. - Expats employed for investments carried out pursuant to this Proclamation whose permanent residence is outside of Ethiopia may remit, in accordance with applicable law, salaries accruing from their employment in convertible foreign currency at the prevailing exchange rate on the date of transfer. <i>Note: what is provided under sub-article 1(d) is not applicable to foreign investors as it relates to collaboration agreements entered by domestic investors.</i> The Industrial Parks Proclamation 21. Applicable Foreign Exchange Rules Any Industrial Park Developer or Industrial Park Operator or Industrial Park Enterprise subject to the laws of the country, shall: - be entitled to borrow funds from banks abroad and domestic financial institutions; - be allowed to list its stocks, bonds and other securities on foreign security markets; - have the right to make remittances, in accordance with paragraph (a) to (g) of sub-article (1) of Article [20] of the Investment Proclamation No. 1180/2020, in a convertible foreign currency at the prevailing rate of exchange on the date of remittance; details of which shall be specified in the regulation.

(Continued)

#	Incentive Summary	Reference	Reference Text
1	The right to make the following remittances out of Ethiopia in convertible foreign currency: a) Profits and dividends; b) Principals and interest payments on external loans; c) Payment related to a registered technology transfer agreement, if any; d) Proceeds from the sale, capital reduction, or liquidation of an enterprise; e) Compensation paid to an investor pursuant to expropriation laws; and f) Proceeds from the sale or transfer of shares or partial ownership of an enterprise to another investor. A foreign investor is availed with foreign currency: a) on priority basis to repatriate its profits and dividends; and proceeds from the sale or liquidation of an enterprise as well as compensation paid; and (b) on demand, without the requirement of registration, to pay principals and interest payments on external loans and suppliers' credits. Expatriate employees are also availed with foreign currency on demand to transfer their employment salaries. Manufacturers are also given priority to access foreign currency to procure machineries, equipment, spare parts, raw materials and accessories.	The Investment Proclamation No. 1180/2020 (the Investment Proclamation), Article 20. The Industrial Parks Proclamation No. 886/2015 (the "Industrial Parks Proclamation"), Article 21 Transparency in Foreign Currency Allocation and Foreign Exchange Management Directives No. FXD/46/2017 (the "Transparency in Foreign Currency Directive") , Article 6.	<u>The Transparency in Foreign Currency Directive</u> 6. Foreign Exchange Allocation and Priorities 6.1 In the allocation of foreign currency, a bank shall give priority to the following import items and payments, among them, on first come first served basis. v) Manufacturing industries requests for procurement of machineries, equipment, spare parts, raw materials and accessories; ... x) profit and dividend transfer ... xi) sales from share and liquidation of companies by FDI 6.2 Foreign Exchange sales on demand Items listed under this article are exempted from registration procedure required under Sub-article 6.1 and shall be served on demand. iv) Payment authorized by the National Bank of Ethiopia: a. external debt payment obligation, i.e., principal interest and fees; b. suppliers credits v) salary transfer of foreign employees.

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#	Incentive Summary	Reference	Reference Text
2	Expedited visa procedure: Expedited procedure of securing entry visa, work permit and certificate of residency for expatriate personnel working in industrial parks and their dependents;	The Investment Proclamation, Article 23 (1, 2, 3, 4, and 6) The Industrial Parks Regulations, Articles 16 and 17.	<u>The Investment Proclamation</u> 23. Visa Services 1) The [Ethiopian Investment] Commission or a delegated investment organ may facilitate the processing of visa applications of foreigners coming to Ethiopia for investment purposes and that of the families (spouses, children and parents) of investors undertaking investments in Ethiopia. 2) If a person, intending to enter into Ethiopia for investment purposes, applies for a visa in a country that is not his home country, visa may be issued to him in that third country based on a support letter of the [Ethiopian Investment] Commission. 3) An owner or shareholder of an investment undertaken pursuant to this Proclamation may be issued a five-year multiple visa based on confirmation by the [Ethiopian Investment] Commission. 4) Top Management of an Enterprise undertaking an investment pursuant to this Proclamation, and the top management of the parent or holding company of the enterprise may be issued a three-year multiple entry visa based on confirmation by the [Ethiopian Investment] Commission. 5) ...
	Better visa terms for investors in industrial parks - multiple entry visa valid for five years for an owner or shareholder of an industrial park developer or enterprise. Multiple entry visa valid for three years for a foreign operator that works in an industrial park, to an industrial park product buyer, worker, manager, executive officer from headquarters, board member or high level professional staff.		6) The [Ethiopian Investment] Commission shall work in cooperation with the Immigration, Nationality and Vital Events Agency and other appropriate government body for the proper implementation for this Article. <u>The Industrial Parks Regulations</u> 16. Visa and Residence Permit 1) The [Ethiopian Investment] Commission may facilitate the processing of visa and residence permit applications of foreign citizens who come to Ethiopia in relation to investment and that of their dependent family members. 2) A foreign citizen who happens to be outside his country of residence may apply for Ethiopian visa from the third country where the reason for travel to Ethiopia pertains to investment. 3) A multiple entry visa, that is valid for 5 (five) years or residence permit may be issued, based on an assurance from the [Ethiopian Investment] Commission, to an owner or shareholder of an industrial park developer or enterprise. 4) A multiple entry visa, that is valid for 3 (three) years or residence permit may be issued, based on an assurance from the [Ethiopian Investment] Commission, to a foreign operator that works in an industrial park, to an industrial park product buyer, worker, manager, executive officer from headquarters, board member or high-level professional staff. 17. Issuance of Work Permit 1) A work permit shall be issued by the [Ethiopian Investment] Commission to a foreign citizen to be employed by an industrial park developer, operator or enterprises that has been given investment permit in relation to an industrial park. 2) A work permit may be issued to the spouse of a foreign industrial park worker who lives in Ethiopia.

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#	Incentive Summary	Reference	Reference Text
3	Customs facilitation: Transport of imported raw materials straight from customs post to factory through bonded warehouse or voucher scheme. The law specifically provides for: (i) all customs procedures to be completed in an industrial park"; (ii) the industrial park, partially or wholly, being a customs-controlled area; and (iii) goods transported by IP developer or enterprise or to and from such customs controlled area of an industrial park to be cleared by simplified customs procedure.	The Industrial Parks Regulation, Article 19. The Industrial Parks Proclamation, Article 2, (22) definition. The Customs Proclamation No. 859/2014 (the "Customs Proclamation"), Article 84-88 (Simplified Customs Procedure).	<u>The Industrial Parks Proclamation</u> 2. Definition In this Proclamation, unless the context otherwise requires: 1) "industrial park customs-controlled area" means an area that is part of the industrial park where customs have the power to control but deemed to fall outside the customs territory. <u>The Industrial Parks Regulation</u> 19. Customs Control 1) All customs procedures shall be completed in an industrial park. 2) An industrial park may either in its entirety or partly be a customs-controlled area. 3) Customs control in connection with industrial parks shall be carried out at the entry and exit gates of the customs territory as well as at the gates of the industrial parks. 4) Goods transported by an industrial park developer or operator or enterprise to or from customs-controlled area of an industrial park shall be cleared by simplified customs procedure. 5) Cargo shipped by an industrial park enterprise from port of entry into the customs territory to an industrial park shall neither be stopped nor examined on route. The goods shall, however, be sealed in a container and the shipping documents that clearly indicate the industrial park to which the cargo is destined. 6) An industrial park enterprise that has undertaken to export its entire produce shall be exempted from any customs duty and tax on raw materials it may import; provided, however, where an industrial park enterprise sells parts of its produce to the customs territory, it shall be subject to appropriate customs duty and tax on the difference. 7) An industrial park enterprise that sells its products as input to another industrial park enterprise that exports its produce shall not be subject to payment of customs duty and tax. 8) Any enterprise located within the customs territory that supplies input produced anywhere within the country to an industrial park enterprise engaged in export shall not be subject to payment of any customs duty or tax on such transaction; an industrial park enterprise that exports products that it produced using input that it purchased in the customs territory shall also not be subject to payment of customs duty and tax on the input used. 9) An industrial park enterprise that has undertaken to export its entire produce may keep up to one year raw material that it imported without payment of customs duty and tax. Where such enterprise establishes good cause to retain such raw material for a period exceeding one year, the [Ethiopian Investment] Commission may allow additional time.
	IP developers are also allowed to send abroad defective, damaged or incomplete capital goods, spare parts and accessories and have them replaced or repaired without any payment to the Ministry of Revenues.		
	For Enterprises: an industrial park enterprise that has undertaken to export its entire produce, or that sells its products as input to another industrial park enterprise that exports its produce, is exempted from any customs duty and other taxes on raw materials it may import.		

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#	Incentive Summary	Reference	Reference Text
3	Customs facilitation: Transport of imported raw materials straight from customs post to factory through bonded warehouse or voucher scheme. The law specifically provides for: (i) all customs procedures to be completed in an industrial park; (ii) the industrial park, partially or wholly, being a customs-controlled area; and (iii) goods transported by IP developer or enterprise or to and from such customs controlled area of an industrial park to be cleared by simplified customs procedure.	The Industrial Parks Regulation, Article 19. The Industrial Parks Proclamation, Article 2, (22) definition. The Customs Proclamation No. 859/2014 (the "Customs Proclamation"), Article 84-88 (Simplified Customs Procedure).	10) An industrial park enterprise that has undertaken to export its entire produce may not, under any circumstance, sell its products within the customs territory; provided, however, it may under special circumstances, if authorised by the [Ethiopian Investment] Board, sell its products within the customs territory subject to payment of appropriate customs duty and tax. 11) Where an industrial park enterprise that is required to export its entire produce provides proof that its products could not meet export standards or its produce has been sent back after being exported owing to defects: (a) may, after securing permission from the [Ethiopian Investment] Commission, sell such products at a special sales event to be organised only twice per year each for a continuous period not exceeding one week within the park at a place designated for such purpose, subject to payment of value added tax or; (b) may donate such products to a charity lawfully established within the country or; (c) get rid of such products by other means. 12) An industrial park enterprise may sell by-products within the customs territory subject to the payment of only value added tax. The value added tax due from the enterprise shall be computed on the basis of the price at which the enterprise sells the by-products. 13) An industrial park developer or enterprise may, by furnishing a letter of guarantee to the [Ministry of Revenues], send abroad defective, damaged or incomplete capital goods, spare parts and accessories and have them replaced or repaired; and the [Ministry of Revenues] may not require any payment as regards this. 14) Where customs duty or tax is not due on goods imported franco valuta by an industrial park developer or enterprise such goods may be sent abroad by the industrial park developer or enterprise, by securing permission from the Authority, without making payments that are charged in relation to goods sent back abroad. 15) An industrial park enterprise may, by adducing evidence to the [Ministry of Revenues] from a relevant governmental institution, cause the removal of input that has expired or is defective.
	IP developers are also allowed to send abroad defective, damaged or incomplete capital goods, spare parts and accessories and have them replaced or repaired without any payment to the Ministry of Revenues.		<u>The Customs Proclamation</u> CHAPTER THIRTEEN SIMPLIFIED CUSTOMS PROCEDURE
	For Enterprises: an industrial park enterprise that has undertaken to export its entire produce, or that sells its products as input to another industrial park enterprise that exports its produce, is exempted from any customs duty and other taxes on raw materials it may import.		84. Authorized Persons 1) The application of simplified customs procedure shall be allowed for selected and registered persons upon fulfilling criteria specified by the [Ministry of Revenues]. 2) The [Ministry of Revenues] shall give special consideration to exporters and manufacturers in setting the criteria for the selection of authorized persons.

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#	Incentive Summary	Reference	Reference Text
3	Customs facilitation: Transport of imported raw materials straight from customs post to factory through bonded warehouse or voucher scheme. The law specifically provides for: (i) all customs procedures to be completed in an industrial park"; (ii) the industrial park, partially or wholly, being a customs-controlled area; and (iii) goods transported by IP developer or enterprise or to and from such customs controlled area of an industrial park to be cleared by simplified customs procedure. IP developers are also allowed to send abroad defective, damaged or incomplete capital goods, spare parts and accessories and have them replaced or repaired without any payment to the Ministry of Revenues. For Enterprises: an industrial park enterprise that has undertaken to export its entire produce, or that sells its products as input to another industrial park enterprise that exports its produce, is exempted from any customs duty and other taxes on raw materials it may import.	The Industrial Parks Regulation, Article 19. The Industrial Parks Proclamation, Article 2, (22) definition. The Customs Proclamation No. 859/2014 (the "Customs Proclamation"), Article 84-88 (Simplified Customs Procedure).	85. Simplified Procedure for Goods Declaration Simplified procedure for goods declaration may include the following: 1) release of the goods on the provision of the minimum information necessary to identify the goods and permit the subsequent completion of the final goods declaration; 2) allowing consolidated goods declaration for all imports or exports in a given period where goods are imported or exported frequently by the same person; 3) allowing the lodgement of goods declaration by means of an entry in the records of the authorized person to be supported subsequently by a supplementary goods declaration. 86. Simplified Procedure for Clearance of Goods Simplified procedure for clearance of goods shall consist of a procedure that allows the clearance of goods at the declarant's business premises or another place authorized by the [Ministry of Revenues]. 87. Self-Assessment of Customs Duty and Tax Liabilities The [Ministry of Revenues] may allow use of the authorized person's commercial records to self-assess duty and tax liabilities and, where appropriate, to ensure compliance with other customs requirements. 88. Audit Based Customs Control The [Ministry of Revenues] shall use audit-based customs control to satisfy itself as to the accuracy and authenticity of simplified goods declarations and compliance with other customs requirements through the examination of the relevant books, records, business systems and commercial data held by the authorized persons.

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#	Incentive Summary	Reference	Reference Text
4	Guarantee against expropriation: Guarantee against measures of expropriation or nationalisation; Expropriation to be made only in conformity with requirements of the law and on a non-discriminatory basis; Payment in advance of adequate compensation corresponding to the prevailing market value of investment property in case of expropriation or nationalisation for public interest.	The Industrial Parks Proclamation, Article 20 The Investment Proclamation, Article 19.	<u>The Industrial Parks Proclamation</u> 20. Guarantee and Protection 1) No Industrial Park investments may be expropriated unless otherwise required for public purpose, and subject to prompt payment of adequate compensation. 2) The compensation shall be paid in any convertible currency in the international financial markets if the investor is foreign investor. 3) Any unlawful expropriation shall entitle the Industrial Park Developer, Industrial Park Operator or Industrial Park Enterprise to the restitution of its assets or investment together with reasonable interest rate calculated as of the time the unlawful expropriation until restitution of such property. 4) The provisions of appropriate law shall be applicable with respect to manner of expropriation and what constitutes unlawful expropriation, compensation and restitution. <u>The Investment Proclamation</u> 19. Investment Guarantees and Protection 1) The Government may expropriate any investment undertaken under this Proclamation for public interest, in conformity with requirements of the law, and on a non-discriminatory basis. 2) In case of expropriation of an investment effected pursuant to Sub-article (1) of this Article, adequate compensation corresponding to the prevailing market value shall be paid in advance.
5	The right to own immovable property: Foreign investors have right to own a dwelling house and other immovable property (excluding land) required for the investment;	The Investment Proclamation, Article 18 (1 & 2).	18. Ownership of Immovable Property 1) Notwithstanding the provisions of Articles 390 to 393 of the Civil Code, a foreign investor or a foreign national treated as domestic investor shall have the right to own immovable property necessary for his investment. Immoveable property as used in this provision does not include land. 2) Notwithstanding the provisions of Articles 390 to 393 of the Civil Code, a foreign investor or a foreign national treated as domestic investor who owns large investment may be allowed to own one dwelling house. The detailed conditions necessary for the implementation of this provision shall be specified by a Regulation.

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#	Incentive Summary	Reference	Reference Text
6	Subsidised utility rates: Subsidised utility rates for manufacturing industries: a) Electricity is sold at the rate determined by the appropriate body; b) Reliable access to electricity within industrial parks – Government avails dedicated power station for parks.	Energy Tariff.	Energy Tariff amendment study according to consumers class
			Tariff amendment
			Tariff category
			As of Dec (2020)
			As of Dec (2021)
			Birr/kwh
			Birr/kwh
			...
			...
			1. Residential tariff block
			2. General Tariff
			2.1 Flat Rate
			2.1240
7	The right to open and operate foreign currency accounts: A foreign investor has the right to open and operate foreign currency accounts in an authorized local bank. Exporters have also the right to open and operate forex retention accounts in an authorized local bank.	The Industrial Parks Proclamation, Article 21. The Investment Proclamation, Article 21 The Retention and Utilization Of Export Earnings and Inward Remittances Directive No. FXD 48/2017 (the "Retention Directive").	3. Low Voltage Industry Tariff
			3.1 Flat Rate
			1.2927
			3.2 Demand Charge rate
			150.0000
			4. Medium Voltage Industry Tariff. 15kv & 33kv
			4.1 Flat Rate
			0.9969
			4.2 Demand Charge rate
			110.6550
			5. High Voltage Industry Tariff. Above 66kv
			5.1 Flat Rate
			0.7911
7	The right to open and operate foreign currency accounts: A foreign investor has the right to open and operate foreign currency accounts in an authorized local bank. Exporters have also the right to open and operate forex retention accounts in an authorized local bank.	The Industrial Parks Proclamation, Article 21. The Investment Proclamation, Article 21 The Retention and Utilization Of Export Earnings and Inward Remittances Directive No. FXD 48/2017 (the "Retention Directive").	5.2 Demand Charge rate
			65.7300
			6. Street Light Tariff
			1.7611
			6.1 Flat Rate
			2.1240
			7. Bulk Supply Tariff
			117.8723
			7.1 Demand Charge rate per kw
			0.6653
			7.2 Generation Tariff. Monthly per kwh
			157.1600
			0.8870
7	The right to open and operate foreign currency accounts: A foreign investor has the right to open and operate foreign currency accounts in an authorized local bank. Exporters have also the right to open and operate forex retention accounts in an authorized local bank.	The Industrial Parks Proclamation, Article 21. The Investment Proclamation, Article 21 The Retention and Utilization Of Export Earnings and Inward Remittances Directive No. FXD 48/2017 (the "Retention Directive").	For the details from the Industrial Parks Proclamation, kindly refer to item #1 above in these non-fiscal incentives table.
			The Investment Proclamation
			21. <u>External Loan and Foreign Currency Account</u>
			1) Any investor may acquire external loan for his investment as per the applicable Directive of the National Bank of Ethiopia.
			2) Any investor may operate a foreign currency account in banks in Ethiopia for the purpose of its investment as per the applicable Directive of the National Bank of Ethiopia.
			The Retention Directive
			Article 3
			<u>Opening of Forex Retention Accounts</u>
			An authorized bank is allowed to open foreign exchange retention accounts for eligible exporters of goods and services and inward remittances.

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#	Incentive Summary	Reference	Reference Text
8	Import raw materials before obtaining business license. The importation of duty-free raw materials and capital goods is applicable not only after project implementation phase (i.e. after the investor starts business operations) but also during project construction phase for training and testing purposes. Expats can open and operate a foreign currency account. Investors are allowed to transact in foreign currency within and across the industrial park. Investors are allowed to pay their expat employees in a foreign currency and directly credit it to the employees foreign currency account.	The Consolidated Board Directives, Section 2.1.	2.Customs Duty Free Importation of Raw Materials for Pilot Products The [Ethiopian Investment] Board has decided for manufacturers to be able to import, before they acquire a business license: 2.1 raw materials to produce pilot products, because pilot products are regarded as training for the worker and are mostly not marketable as such products are exposed to product-failures; free from customs duty. (translation by legal counsel from the original Amharic version)
9		Foreign Exchange Transaction in Industrial Parks Directive No FXD/59/2019, Articles 4&5.	<u>Article 4</u> <u>Purchasing and Selling Raw Materials with Foreign Currency</u> 4.1 An investor may buy raw material or input in foreign currency manufactured by another investor within the same industrial park or across another industrial park from its foreign currency and/or retention account. 4.2 An investor may sell its manufactured product within the industrial park as an input to another investor within the same industrial park or across another industrial park in foreign currency via credited to its retention account. <u>Article 5</u> <u>Opening of Foreign Currency Account to Foreign Employee of Industrial Park</u> 5.1 An investor may pay the salary of his foreign employee in foreign currency from its retention account or foreign currency account. 5.2 A foreign employee of industrial park is allowed to open foreign currency account within a bank located in the industrial park by submitting application letter, work permit, resident ID and employment contract showing monthly salary which is payable in foreign currency. 5.3 The foreign currency account of a foreign employee shall be credited to the maximum of his net monthly salary excluding any other benefits, including but not limited to, a value of free accommodation gratuity and accumulated leave pay. 5.4 A foreign employee may transfer abroad or reconvert into Birr at any time from its foreign currency account.

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#	Incentive Summary	Reference	Reference Text
10	An industrial park enterprise manufacturing accessory to apparels are also exceptionally allowed to: a) employ cut-make-trim method through contract based relaying practices; and b) subject to fulfilment of the conditions attached, import and sell accessories to another enterprise exporting its products.	The industrial Park Directive, Article 35 and 36.	SECTION EIGHT SPECIAL PROVISIONS CONCERNING TEXTILE AND APPAREL 35) <u>Using Contract Based Relaying Practices</u> Industrial park enterprises engaged in textile and apparel production may employ cut-make-trim method through contract based relaying practices by obtaining supply of readily cut garment, and making and trimming such garment in accordance with design and standards given to them by their overseas buyers. 36) <u>Importation of accessories to apparels</u> 1) An enterprise that manufactures accessories to apparels may import such accessories and sell them to an industrial park enterprise that exports its produce. 2) The enterprise that manufactures accessories to apparels indicated in sub-article 1 of this Article shall secure investment permit in accordance with relevant laws. 3) In order for the enterprise that manufactures accessories to apparels to get an investment permit following sub-Article 1 of this Article, it shall submit a definite plan showing the commencement of: a) production of at least one of its produces during first year; and b) submitting a concrete plan showing that the enterprise will start full production of its other products within five years and conclude an agreement to this end with the [Ethiopian Investment] Commission.

3 EIC ONE-STOP SHOP

#	Incentive Summary	Reference	Reference Text
1	a) Issuance of investment permits; b) Issuance of business licenses; c) Commercial registration certificates; d) Issuance of work permits; e) Registration of trade or firm name; f) Technology transfer agreements; g) Notarizing memorandum and articles of association; h) Issuance of customs duty exemptions; i) Issuance of tax identification number (TIN); j) Customs clearance in industrial parks; k) Banking services. While the Ethiopian Investment Commission delivers all the services from item (a) to (i) above, IP will also benefit from customs clearance, banking, and other essential services from within the compound.	The Investment Proclamation, Article 24 The Industrial Park Regulation, Article 15. The Industrial Parks Directive, Articles 23 and 24.	<u>The Investment Proclamation</u> 24. One Stop Service 1) The [Ethiopian Investment] Commission shall provide one-stop services to investors it has issued investment permits pursuant to this Proclamation; it shall coordinate relevant Agencies and synchronize their daily functions. 2) Regional State investment Organs shall provide one-stop services to investors they issued investment permits in accordance with applicable Federal and Regional State Laws. <u>The Industrial Park Regulation</u> SECTION FIVE ONE-STOP SHOP SERVICE AND RELATED MATTERS 15. One-stop Shop Service 1) An industrial park developer, operator or enterprise that has been issued investment permit by the [Ethiopian Investment] Commission shall have access to the following one-stop shop services at a park level: (a) renewal, amendment, change or replacement of investment permit or issuance of investment permit for expansion of investment project; (b) change or amendment of commercial registration or issuance of substitute certificate of commercial registration; (c) issuance and renewal of business license, or issuance of substitute business license; (d) amendment or change of the name of a business organisation; (e) registration of trade name, giving substitute trade name, amendment of trade name certificate or its cancellation; (f) registration and renewal of registration of the association of industrial park enterprises; (g) registration of foreign direct capital; (h) issuance and renewal of visa, issuance and renewal of residence permit; (i) issuance of work permit, its renewal, replacement and cancellation; (j) approval of exemption from customs duty and franco valuta importation of goods; (k) approval of income tax holiday; (l) receipt and entertainment of requests for transfer of construction materials, capital goods, spare parts and motor vehicles from an industrial park enterprise entitled to exemption from customs duty to another enterprise with the same entitlement within a single industrial park;

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#	Incentive Summary	Reference	Reference Text
1	a) Issuance of investment permits; b) Issuance of business licenses; c) Commercial registration certificates; d) Issuance of work permits; e) Registration of trade or firm name; f) Technology transfer agreements; g) Notarizing memorandum and articles of association; h) Issuance of customs duty exemptions; i) Issuance of tax identification number (TIN) ; j) Customs clearance in industrial parks; k) Banking services. While the Ethiopian Investment Commission delivers all the services from item (a) to (i) above, IP will also benefit from customs clearance, banking, and other essential services from within the compound.	The Investment Proclamation, Article 24 The Industrial Park Regulation, Article 15. The Industrial Parks Directive, Articles 23 and 24.	(m) authentication of documents including memorandum of association, articles of association and amendments thereto; (n) issuance of tax identification number to employees in the industrial park and communication of decisions regarding income tax holiday to expatriate employees; (o) registration of industrial park enterprises for value added tax, refund of value added tax, granting permits and rendering services such as in relation to implementation of voucher and other export incentives; (p) provision of declaration of tax, payment of tax, tax refund, tax audit and other services pertaining to tax; (q) conduct of registrations pertaining to employers and workers; (r) issuance of certificate of origin and other supporting certificates necessary to benefit from special market opportunities; (s) approval of environmental impact assessment studies and issuance of certificate; (t) issuance of a certificate of competence, and other certificates required in the marketing of products, where necessary; (u) provision of banking, insurance, shipping, logistical and other services of relevance to the park; (v) issuance of certificate of residence to industrial park residents; (w) collection of contributions from employers and employees to the private organisations pension fund; (x) follow up and give support regarding the safety and health of workers in relation to work; (y) handling complaints and resolving disputes or creating conducive condition for resolution of disputes by appropriate organs, especially using alternative dispute resolution methods. 2) All relevant government organs that are required to give service to industrial park end-users shall have duty to provide service either presence in the one-stop shop service or designate the [Ethiopian Investment] Commission or another appropriate institution to provide such service on their behalf within a park. 3) ... 4) Governmental institutions that are responsible for rendering one-stop shop service in the park shall set up structure and detailed operational procedures that take into account the nature of industrial parks. 5) Relevant government organs shall, under the coordination of the [Ethiopian Investment] Commission, conclude agreement among themselves with the view integrating and making one-stop shop service effective.

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#	Incentive Summary	Reference	Reference Text
1.	a) Issuance of investment permits; b) Issuance of business licenses; c) Commercial registration certificates; d) Issuance of work permits; e) Registration of trade or firm name; f) Technology transfer agreements; g) Notarizing memorandum and articles of association; h) Issuance of customs duty exemptions; i) Issuance of tax identification number (TIN) ; j) Customs clearance in industrial parks; k) Banking services.	The Investment Proclamation, Article 24 The Industrial Park Regulation, Article 15. The Industrial Parks Directive, Articles 23 and 24.	<u>The Industrial Parks Directive</u> SECTION SIX ONE-STOP SHOP SERVICE 23) Coordination of an Industrial Park One-Stop Shop Service 1) The [Ethiopian Investment] Commission's responsibility, in accordance with sub-article ② of Article 27 of the [Industrial Parks] Proclamation and sub-article (3) of Article 4 of the [Industrial Parks] Regulations, to coordinate and implement industrial park one-stop shop service rendered by relevant government organs shall principally include: a) ensuring the timely assignment of staff by itself and relevant government organs or other institutions, their regular attendance and the existence of coordinated relations among them; g) facilitating provision of one-stop shop service through electronic method 24) Assignment of One-Stop Shop Service Staff by Relevant Government Organs 1) A relevant government organ or any other institution expected to present within an industrial park or render one-stop shop service shall assign adequate number of competent staff timely. 2) Where a relevant government organ has delegated another relevant government to give one-stop shop service in accordance with sub-article (1) of this Article, such government organ shall ensure that the delegate assign sufficient number of competent staff in timely fashion.
	While the Ethiopian Investment Commission delivers all the services from item (a) to (i) above, IP will also benefit from customs clearance, banking, and other essential services from within the compound.		

Annex 2 Integrated agro-industrial parks in Ethiopia

Ethiopia is currently constructing four pilot Integrated Agro-Industrial Parks (IAIPs), including Yirgalem, Bulbula Bure, Baeker and most of them are planned to be completed in 2021. Yirgalem IAIP is located in SNNP region, close to the coffee production area and around ample fruit resources. It is thus suitable for coffee and fruit processing investment. Bulbula IAIP is situated in Oromia region, close to rich cattle resources, where fattening farms and abattoirs concentrate. It has potential for the development of animal husbandry and meat processing. Bure IAIP is located in Amhara region, close to crop growing areas, suitable for investment in crop processing. Baeker IAIP is located in Western Tigray where sesame and sorghum grow, suitable for investment in the processing of sesame and other crops.

Foreign investment in IAIPs can enjoy various tax exemption incentives. For details, please refer to Annex 1. All IAIPs will include open area production zones, controlled environment growing, precision farming, knowledge hubs and research facilities, rural hubs, agro-infrastructure, collection centres, primary processing hubs, social infrastructure and agro-marketing infrastructure, among others. Besides, IAIPs will have modern infrastructure. General infrastructure includes: roads, power, water, communications, drainage, sewerage, a sewage treatment plant and an effluent treatment plant, among other infrastructure. Specialized infrastructure consists of cold storage units, quarantine facilities, quality control labs, quality certification centres, raw material storage and central processing centres, among other specialized infrastructure.

Each IAIP is served by a network of rural transformation centres which provides linkages to producers. It facilitates the contact between investors in IAIPs and producers in rural communities. An RTC is a facility that provides integrated services within a 100-kilometer radius of an IAIP site. At the RTCs, agricultural produce is collected, sorted, stored and then transported to IAIPs for processing.

Name of IAIP	Yirgalem	Bulbula	Bure	Baeker
Location	Yirgalem in Eastern SNNP regional state	Bulbula town in Central Eastern Oromia regional state	Bure town in South West Amhara regional state	Baekertown in Western Tigray regional state
Size	214.86 hectares for initial development	263 hectare for initial development	260.35 hectares for initial development	258.62 hectares for initial development
Agricultural potential	Cereals, coffee, fruits and vegetables, dairy and meat and other animal products	Availability of two operational sugar plantations Concentration of fattening, dairy farms, abattoirs Fishery potential, Koka dam, rift valley lakes (Zeway, Langano) Wheat, barley, haricot bean, fava bean, tomato, potato, fruits and vegetables, dairy, fish, poultry, honey and meat	Maize, sesame, potato, live animal (cattle, sheep, goat) dairy, meat, poultry and honey	Sorghum, sesame, fruits and vegetables, dairy, meat and other animal products



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