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CROSSBREED CATTLE: ASSESSMENT AND CHALLENGES OF BREEDING IN SELECTED DISTRICTS OF TIGRAY AND AFAR REGIONAL STATES, ETHIOPIA

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Abstract. The practice of animal husbandry has played an important role in enhancing sustainable development and improving food security of the community. However, the contribution of this sector towards the national as well as regional economy is very small. The focus of this research is to identify the main reasons why rural farmers do not own rear crossbreed cattle. The data obtained reveals that the majority of the rural communities dont have the right knowledge about the importance of crossbreed cattle in terms of their high yield. Some of the rural residents who are aware said they have limited financial access to afford crossbreed cattle. Besides, the respondents replied that the lack of appropriate feed and its high consumption is another reason, although the output gained from crossbreed cattle is quite high compared to the indigenous animals. Therefore, with the available livestock resource in Ethiopia it is recommended to increase the awareness of importance of crossbreed cattle, and government should also focus on creating favorable conditions to access to financial resources and feed for cattle. Solving the main bottlenecks will assure sustainable development and enable to meet the growing demand of the region. In addition to this, the income disparities between farmers and other self and government employed resident can be minimized.

Key words: agriculture, animal husbandry, crossbreeding, cattle, assessment, livestock feed, indigenous cattle, exotic cattle, milk, urban and peri-urban farming.

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ГИБРИДНЫЙ КРУПНЫЙ РОГАТЫЙ СКОТ: ОЦЕНКА И ПРОБЛЕМЫ РАЗВЕДЕНИЯ В НЕКОТОРЫХ РАЙОНАХ ШТАТОВ ТИГРАЙ И АФАР (ЭФИОПИЯ)

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Аннотация. Животноводство всегда имело большое значение для стабильного развития экономики и повышения продовольственной безопасности стран. Однако вклад данного сектора отрасли сельского хозяйства в национальный или региональный ВНП незначителен. Данная статья акцентирует внимание на основных причинах, почему фермеры не выращивают гибридные породы КРС. Полученные результаты показывают, что большая часть работников сельского хозяйства не имеют достаточно информации о важности гибридов пород КРС и их высокой сельскохозяйственной производительности. Некоторые фермеры заявляют об осведомленности о возможностях гибридных видов КРС, но отмечают ограниченность финансовых ресурсов для их приобретения. Кроме того, респонденты отвечали, что недостаток соответствующего корма и его высокое потребление являются одной из причин, почему фермеры от них отказываются, хотя выход продукции от гибридных пород КРС намного выше по сравнению с местными породами скота. Тем не менее, учитывая имеющееся поголовье КРС в Эфиопии, рекомендуется распространять информацию о важности разведения гибридных пород КРС, а правительство должно приложить усилия для повышения доступа фермеров к финансовым ресурсам и кормам для КРС. Решение основных проблем позволит достичь устойчивого развития экономики страны и удовлетворить растущий спрос в регионе. Кроме того, данные меры помогут уменьшить разрыв в уровне доходов фермеров и других групп работающего населения.

Ключевые слова: сельское хозяйство, животноводство, скрещивание животных, крупный рогатый скот, оценка, корм для скота, отечественные виды КРС, экзотические виды КРС, молоко, городское и пригородное фермерство.

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Introduction

Agriculture is the main engine of Ethiopian Economy. Ethiopian agriculture is part of the agro-industrial complex and includes the following main sectors: the crop production sector and animal husbandry. Several Research findings indicate that the growth of agricultural productivity plays an important role in reducing poverty as agriculture is the main source of income to both rural and urban Ethiopians [Zewudu, Bamlaku, 2014; Bezabih, DiFalco, Mekonnen, 2014; Robinson, Strzepek, Cervigni, 2013; Wagesho, Goel, Jain, 2013]. According to IBC [IBC, 2004] animal husbandry is a system of rearing animals such as camels, goats, cattle and sheep for milk and meat as source of food, nutritional security, which is practiced for almost 1 billon poor people in developing countries. About 40% and 30% contribution to agricultural Gross Domestic Product of world and developing countries respectively comes from livestock [World Bank, 2009].

It is also one of the main sources of Ethiopian economy and plays a crucial role in the lives of both farming community and the pastoral community who solely used livestock and livestock products as a means of livelihood. For the smallholder farmers, some of the live animals are traditionally used to plough the land and their manure as a natural fertilizer. Ethiopia is the leading country in Africa and 5th ranking in the world with livestock population accounting for 60.39 million heads of cattle, 31.3 million sheep, 32.74 million goats, total poultry population [include cocks, cockerels, pullets, laying hens, non-laying hens and Chicks) 60.04 million, 11.32 million equines (donkeys, horses, mules), 6.523.969 beehives and 1.42 million camels, distributed in all the administrative regions CSA [CSA, 2018]. About 12.5 million households, or 70 percent of the total population, depend fully or partly on cattle for their livelihoods [FAO, 2018]. According to Duressa [Duressa, Kenea, Keba, Desta et al., 2014], Metaferia [Metaferia, Cherenet, Abnet, Tesfay et al., 2011], the contribution of livestock sector to Ethiopian economy was 15% of export earnings, 16.5% of the national GDP, 30% of agricultural employment and 35.6% of the agricultural GDP. This sector also plays an important role in assuring food security of the Ethiopian smallholders especially for pastoralists who completely depend on. It has also been strengthened by the report of CSA [CSA, 2017] that the livestock sector is a social and cultural asset and contributes to environmental values and sustains the livelihood of the rural community by creating jobs, ensuring food security and generating incomes.

According to recent Food and Agriculture Organization (FAO) projections, the demand for meat will increase by 80% by 2030 and by more than 200% by 2050 in lower- and middle-income countries [FAO, 2018]. Similarly, due to increase in population size, urbanization and income, the need for livestock product in Ethiopia has been increasing. Such high demand is projected due to the high rate of population

growth [Baldi, Gottardo, 2017; Hassen, Dereje, Minten, Hirvonen, 2016; UN, 2017]. Besides, the demand for livestock products such as milk, meat, and eggs are growing rapidly in Ethiopia [Thornton, 2010; Wright, Tarawali, Blummel, Gerard, 2012]. Majority of the livestock products are obtained from smallholders [FAO, 2015; IFAD, 2015; World Bank, 2007].

According to Roswitha [Roswitha, Hoffmann, 2012], it will be very difficult to achieve the millennium goal of doubling the food production unless efficient livestock productions are in place. To meet the projected demands, it is necessary to focus on increasing productivity of livestock and maintain the development of the sector. Trying to improve the productivity of the indigenous cattle through feed, water availability and other inputs alone is not enough to meet the projected demand [Zelalem, Emmanuelle, Sebsibe, 2011]. In order to do so, sustainable and effective genetic improvement of cattle is necessary and should be sustained for visible livestock sector development. These crossbreed cattle are better in terms of output per unit feed [WISP, 2010]. This type of production system mostly applied in landless production system. Land less livestock production system is practiced in urban and peri urban areas with two types of husbandry practices are taken place where the livestock either completely controlled (with no grazing chance) or partially controlled with forage access for feeding [WISP, 2010]. This type of production system (urban diary cattle) mostly practiced in cities and towns where there is almost no grazing land resource where the produced milk is mostly for sale. This production system highly depends on human capital for stall feeding conditions [Azage, Gebremedhin, Hoekstra, Belay et al., 2013]. Azage and his Colleagues in their study also indicated that, the peri urban diary system are mainly practiced in rural areas near to town/cities with better access to urban areas where the demand for livestock production is high. Zelalem and others [Zelalem, Emmanuelle, Sebsibe, 2011] revealed that this system has a significant impact on filling the growing future milk demand and create high job opportunities [Gillah, Kifaro, Madsen, 2012].

This study focused on urban town of Southern Tigray, Alamata Woreda, and semi urban, Yallo woreda, of Afar Regional State. These areas were chosen based on their historical relationship as these people used to visit one another for different purposes. The afar people comes to Alamata sometimes to sell their livestock and to purchase their cereal foods. On the other hand, the Alamata farmers and merchants visits Yallo woreda to sell their cereal products and buy livestock and livestock products. With this relationship in mind, the researcher assumes that there is an opportunity for cultural and knowledge exchange between the community. This study, therefore, will discuss the types of cattle available in the two study areas, reveal the perception of the two different communities towards crossbreed cattle, and the challenges they have been facing in the livestock production system. This study is based on qualitative research design on primary data collected through In-depth interview and focus group discussions from both those involved in production system with crossbreed cattle in urban and peri-urban areas and those who are not in order to identify the gaps.

Ethiopian Cattle production

It is often reported that Ethiopia has the largest livestock population in Africa. CSA data show that there are 60.39 million heads of cattle of which 99% are indigenous [CSA, 2018]. Cattle are a very common asset in Ethiopian households; 12.5 million households, or 70 percent of the total population, depend fully or partly on cattle for their livelihoods [FAO ... , 2018]. Though the demand for livestock production has been increasing in the country, the livestock sector's productivity is low due to undernutrition and malnutrition, high prevalence of diseases, poor genetic resource management, poor marketing infrastructure and low use of technological inputs [Swanepoel, Stroebel, Moyo, 2010].

Most dairy cattle production system in Ethiopia depends on low producing indigenous breeds of cattle. Dairy cattle production systems already existing in Ethiopia is part of four major livestock production systems: specialized commercial dairy production systems, pastoral and agro-pastoral production, rural smallholder (mixed crop – livestock) production and urban and peri-urban smallholder dairy production.

Indigenous cattle comprise majority of livestock population in Ethiopia covering the major share of milk both in urban and peri-urban areas. There are five classes of Ethiopian cattle breeds such as Humpless Brachyceros, Hamatic Longhorn, Zebu, Sanga and intermediate Sanga/Zebu in which they constitute 28 indigenous breeds in Ethiopia [EBI, 2016]. Although indigenous cattle can tolerate harsh climates, good diseases and heat resisting capacity, adapt to live with scarce feed resource, their output per cattle is limited.

The production and reproductive performance of cattle is a key determinant factor to assure

sustainable livelihood improvement of those engaged in the system. Ethiopian livestock sector hardly uses technological adaptation where almost all livestock types are indigenous, and the percentage of hybrid livestock population is too limited which has limited the average yield. This is strengthened by B. Hagos [Hagos, 2015] that the breed enhancement practices in the country is low. In order to increase the export of leather and leather products, live animals and livestock products such as leathers and leather products, meat and milk products, improving the livestock sector in terms of quality and quantity is mandatory. This can be supported with development of and implementation of genetically modified crops and animals [Bezabih, DiFalco, Mekonnen, 2014]. Accordingly, the Ethiopian government has introduced genetically improved breeds such as exotic breeds and crossbreeding the indigenous once with the exotic types to improve the output per cow. According to studies [Habtamu, Kelay, Desie, 2010; Chebo, Alemayehu, 2012], Ethiopia has introduced exotic cattle breed several decades ago (since 1950s), mostly the Holstein Friesian breed when 300 Friesian and brown swiss dairy cattle are donated by the United Nations to Ethiopia which also are crossbred with the indigenous once [Belihu, 2002]. There have been several cattle productivity improvement programs implemented in Ethiopia for different purposes. The first cattle genetic improvement program was implemented in 1963 with the purpose of commercial dairy farm development [Chebo, Alemayehu, 2012] followed by Chilalo and Walaita [Kiwuwa, Trail, Kurtu, Getachew et al., 1983] agricultural development units in 1967 and 1973 respectively with the aim of improving small scale dairy farming. According to Haile Mariam, both Walaita and Chilalo agricultural development units started to produce semen for Artificial Insemination in 1973. In 1987, Ministry of Agriculture launched the Selale Dairy Development Piolet to improve the livelihood of the smallholders by introducing crossbreeds. The National Artificial Insemination Center was established in 1981with the purpose of crossbreeding the indigenous cattle breeds. In addition to those programs, in order to sustain and improve the genetic makeup of cattle breeds, the Ethiopian Biodiversity and Several Higher educational institutions have been involved [Hoffmann, Baumung, 2012].

As indicated in the CSA report, most cattle in Ethiopia that are reared by the agrarian community are mostly of native breeds/ecotypes which is about 98.2 percent of the total cattle present at country level and the rest 1.62 are crossbreed and 0.18 are exotic cattle breeds [CSA, 2016/2017].

According to the CSA report, cattle in Ethiopia are mainly kept for milk, draught power, breeding and beef purpose, and have also contribution of milk production performance annually with about 3.1 billion litters with 1.37 liter milk yield per day by having 6 month average lactation length per single lactation [CSA, 2016/2017]. Their production performance was recorded to be low because of their low level of inputs, genetic make-up and traditional husbandry practice besides environmental stress [Azage, Gebremedhin, Hoekstra, 2010]. As indicated by [FAO, 2010], dairy cattle are a significant contributor of milk, meat and drought power and manure for fertilizers and fuel.

The amount of cow milk production has a fluctuating trend as indicated in table above where the milk gained from cow has decreased by billion liters in 2017/18 compared to the milk gain of 2012/13 while the population of female cattle has relatively increased. In the year 2017/18, it is estimated that a total of 3.3 billion liters of milk was gained from indigenous cow. It is therefore important to look for better milk producing cattle breeds.

Perception towards crossbreed cattle

The attitude of consumers towards genetically modified foods are different depending on the level of knowledge of the technology. Due to this, there have been differences among global consumers on whether genetically modified foods are good for health.

According the focus group discussion and interviews, most of the participants who are engaged in rearing crossbreed cattle breeds in the town of Alamata and its surrounding rural areas agreed that they all have enough information about the benefits of these types of cattle. The majority indicated that the importance of these cattle breeds in terms of

Table

Estimated milk production per years in Ethiopia, 2012/13–2017/18

Year	2012/13	2013/14	2014/15	2016/17	2017/18
cow milk	3.8	2.9	3.07	3.13	3.3

Note. Source: CSA. Central Statistical Agency annul reports.

out is high. Some of the participants raised that they prefer the indigenous cattle despite the low out put the delivered compared to the crossbreed once. The main reasons they pointed out was the taste difference between the products of the two types of cattle. They also indicated that there is not enough evidence whether there is better nutritional content in the milk and meat of crossbreed cattle. Despite these differences, they agreed that the milk output per cow is higher for the crossbreed cattle compared to the local types where the amount of milk obtained from crossbreed cattle is three/four times higher than the indigenous once. In addition to this, the length of time of milking them is quite different after meting. The local cattle type can only be milked for a month after mating while the crossbreed cattle can be milked for over six months after mating. The calves born from the crossbreed cattle grow faster (ready for mating in a less than 18 months) while it takes four to five years to the calves born from indigenous cattle.

As per the discussion and interviews, there hardly exists farmers who rear male crossbreed cattle. If there is a calf born from the crossbreed cow, it will immediately be sold for those who are engaged in meet market. Those who have tasted the meet said that it is better than the indigenous cattle in terms of softness, but they don't have any idea about the nutritional differences.

The perception of the Yallo woreda participants towards crossbreed cattle type was found to be none. None of them have reared these types of cattle although they heard they are available somewhere in other regions like town of Alamata. But, due to the integration with their cattle, they didn't give much attention to look for the difference in output difference. The respective government authorities also didn't even try to explain and create awareness about it. According to some of the participants in the interview, there has been a new way of looking to understand the difference between these cattle types in terms of their output per cow. These is because of drought in many areas of Afar (especially Teru woreda of the region which is near to yallo woreda and where the people of Teru mostly visit yallo for market), some of the those who rear crossbreed cattle types start sending milk to teru woreda to sell where they have to pass through yallo woreda. This situation enabled them to seek for answer on how all these milks can be produced and sell. One of the interviewees said: "…this makes me very emotional. It is very difficult to see milk being sold to us, it was us the pastoralists who should have enough milk for consumption and for market. I heard all these amounts of milk was produced by a few cattle while we couldn't produce even for our own consumption. This is not because of drought only. We need to think about it. Our government should focus as well" [Hoffmann, Baumung, 2012].

In general, the perception of the rural Afar towards crossbreed cattle cannot be generalized by this study although almost all the people of Yallo woreda don't have enough information about these types of cattle. Further study, covering all the Afar Regional State pastoralists and semi pastoralist, on the perception towards crossbreed cattle should be done On the other hand, most of the Alamata town farmers have the basic information about the importance of crossbreed cattle although they all don't rear them due to several factors. On the rural side of Alamata city, majority of them have the awareness about these types of cattle. But they are not interested in rearing them due to the high price allotted to them in the market although the possibility of getting them on market questionable.

Challenges

The main challenges of livestock sector in Ethiopia are all related to low productivity. The main challenges in peri-urban and urban areas are scarcity of water which force them to compete with their animals, animal health, low feed availability and quality and mall areas of husbandry. The production performance of crossbreed cattle should be monitored. But, the information about their productivity and reproductive performance is limited especially in urban and peri urban farming.

In this research, the following challenges has been observed in the husbandry practice of Alamata town. The respondents for this research are those who are rearing crossbreed cattle. They are chosen because they are more exposed to the practice and to provide some of the reasons that has been indicated by those who are not rearing them.

One of the main challenges mentioned by the respondents was scarcity of land to rear them. They are forced to manage the cattle in their home, and this creates a big environmental problem. Besides, it become one of the main reasons for their family's health problem. To solve this, they have been applying for a place to rear these cattle types as they became more important in trying to meet the milk demand of the residents of the town and even beyond (they are sending to Teru Woreda, Afar Regional State).

The cattle are reared in the compound where the family lives which is very difficult to live with animals in the same place. The photo is taken from one of the holder's residence house. Without proper place for animals, it is difficult for the practice of animal husbandry. Homestay animal husbandry system can affect the environment and the family's health as well. Therefore, government should solve this problem as quick as possible. According to some of the respondents who has applied for a place, though the higher authorities forward their application to the lower part of the structure, the need for corruption is becoming a big challenge in getting the required place very quickly. This is a cancer to avoid. Therefore, the responsible heads of such activities should follow up the status despite forwarding the application. In order to provide animal rearing place to those engaged in urban areas, the corruption is the bottleneck.

The second reason was feed-related. These animals are reared over zero grazing where owners are forced to purchase. Besides to this, the intake capacity of these types of cattle are very high. Due to this, many urban and peri urban farmers are afraid to get into this business. One of the respondents said that *"even though you can afford the cost, there is not quality of feed to buy"*. In the country, there is enough livestock feed. The problem is the way that has been managed. In some part of the country, there area where livestock feeds that are burnt and at some other areas, they simply dry while some place are challenged with shortage of feed. It is therefore better creating cooperatives that can collect and distribute to areas in need. This will improve both the feed need and will involve many people in the work which in turn will have significant impact on the livelihood of everyone and the country's economy. In addition to this, genetically modified crop feeds should be introduced.

The other challenge raised was the availability of credit service. The government support in credit availability is limited and the cost of one crossbreed cattle is more than 75000.00 Ethiopian birr approximately 2400 USD which is very difficult to afford. The government should take measures in order to supply the urban and peri urban farmers with the credit access they need. This will increase the number of urban and peri urban farmers engaged in this type of business which in turn will create jobs.

The absence of technology introduction to enhance the production and distribution mechanisms is the other challenge to those who are involved in the business. Milking is done traditionally and the distribution as well. Milking is done manually as it in all over the country which is a concern to safety and is an important contributor to the health risk.

As it was mentioned earlier, they try to sell milk to those in need in the Afar Regional State, Teru Woreda. With the difficulty of the transportation system where there is no good road and no truck (they can't afford to buy) with cooling system to deliver the milk before it is spoiled. Yet, whatsoever happening, they are trying to transport it in a night-time to make sure the milk won't spoil due to the hot weather of the area. Yet this not enough measure to reduce the risk of health which might be developed in the destination area. It is therefore better either to introduce crossbreed cattle voluntarily as the Afar community are highly value their indigenous cattle. The government must create conducive environment to the urban and per urban farmers to buy the required technologies with the creation of cooperatives.

The other bottleneck mentioned by the participants of this research were the performance of extension workers. The agricultural extension workers are responsible for supporting the practitioners in their everyday activities to help them improve their productivity. These extension workers are also responsible for creating awareness of every aspect of livelihood improvement strategies in the agricultural sector. The urban farmers living in the town of Alamata, who are involved in this research said that they have never been contacted by any extension worker although they need advices on how to feed, milk and keep the health of their cattle and the environment at the same time. They also replied for the question if there has been an opportunity for training and replied as there has been for training, but only for one or two persons most probably a member of the leading political party. The problem is not only limited to the size of trainees. There was no platform where these trainees tried can share what they have learnt from the training. The responsible government authorities should allocate extension workers in for urban farmers and follow their expertise in order to achieve the goals intended.

Conclusion

Sustainable economic development can only be assured if equal attention is given the labor-intensive sector of a country. Agriculture is practiced by more than 79% of Ethiopian community where livestock production is an important part of it. The livestock sector has been playing an important role in Ethiopia's economy. In order to improve the economic

development of Ethiopia, increasing livestock productivity is mandatory.

More than 98% of Ethiopian cattle population are indigenous cattle, 1.62 crossbreed and 0.18 are exotic cattle breeds. Those exotic types are only managed under big animal farms while crossbreeds are rare and mostly managed by urban and peri-urban farmers. The milk productivity in liter per indigenous cattle is much lower compared to the output of the crossbreeds. Yet, they are very less owned by rural farmers across the country. The level of awareness about the importance of the crossbreed cattle in terms of high yield of milk and length of milking period in the town of Alamata town and its surrounding districts is low while the Yallo pastoralists don't have any information.

Shortage of land for crossbreed cattle production, lack of quality and shortage of feed, weak credit services and absence of improved technology introduction are the main bottlenecks the urban and per-urban farmers have been facing. In addition, lack of access to quality road infrastructure and transport access to neighboring Afar Regional State woredas where the produced milk can be sold is another challenge to the farmers engaged in crossbreed cattle production. The government support in providing the required space for crossbreed cattle production is just limited to forwarding the letter to implementing structure where these implementing officers are highly corrupted. Despite forwarding the application letter for land to the responsible person, weak follow up of higher officials and unavailability of extension workers to support urban farmers.

Hence, it is recommended that the government and other stakeholders should work towards identifying the sources of the main bottlenecks mentioned above and devise mechanisms to tackle them. Proactively solving the challenges of the urban and peri-urban farmers will enhance the probability of meeting the growing demand for livestock products which in turn will reduce the regional and local inequality and assure sustainable development in the region and the country at large. In addition to this, urban and peri-urban farming should be promoted with awareness creation platforms.

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