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Provision of Technical Assistance for Enhancing Climate Resilience and Economic Sustainability of Livestock Farming in a Rural Community of Mongolia

Deliverable 4.2:
Design of business models with a meat-processing center for climate-resilient livestock farming in Bayantümen soum

Submitted to: The United Nations

UN environment programme

CTCN
UN Climate Technology Centre & Network

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About the project

The project will strengthen climate-resilient livestock farming while deriving the economic sustainability for vulnerable herding communities in Bayantümen soum and contributing to the Nationally Determined Contributions (NDC) and national climate change adaptation and mitigation priorities for Mongolia. Alinea implements this project with the Alberta Biodiversity Monitoring Institute (ABMI) and the R&D Center for Climate Change and Sustainable Development (CCSD) in Mongolia (www.climatechange.mn).

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Acronyms

ABMI	Alberta Biodiversity Monitoring Institute
ASDIP	Aimags and Soums Green Regional Develop. Investment Program
CCSD	Climate Change and Sustainable Development
CTCN	Climate Technology Centre and Network
DFZ	Disease Free Zones
DSS	Decision Support System
EIA	Environment Impact Assessment
FAO	Food and Agriculture Organization
FMD	Foot and Mouth Disease
GCF	Green Climate Fund
GEF	Global Environment Facility
HACCP	Hazard Analysis and Critical Control Points
IFC	International Finance Corporation
LAMP	Livestock and Marketing Project (World Bank)
NDC	Nationally Determined Contributions
NSO	National Statistical Office
PES	Payments for Environmental Services
PUG	Pasture User Groups
SPS	Sanitary/Phytosanitary Requirements
SWOT	Strengths, Weaknesses, Opportunities and Threats
TA	Technical Assistance
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
WWF	Worldwide Fund for Nature

1 Overview of the Report

The objectives of the overall United Nations (UN)-Climate Technology Centre and Network (CTCN) technical assistance (TA) is to:

1) Enhance the capacity and knowledge of herding communities on climate-resilient livestock farming and
2) Facilitate decision-making to invest in community-scale sustainable meat processing system to improve the livelihood from livestock farming and enable the vulnerable communities to derive the best value from the livestock farming while dealing with the adverse impacts of the climate change.

Furthermore, the UN-CTCN hopes that the decision-making process used for Bayantumen soum could provide a Decision Support System (DSS) for soums across Mongolia to determine their climate vulnerability, pasture strategies and feasible value chain opportunities.

Developing business models for the meat sector that will sustain the rangelands and livelihoods for rural communities requires a holistic approach that considers the entire value chain. It is not enough to just consider developing a meat-processing center, or to establish a feedlot. Each segment of the meat value chain has specific economic aspects and management issues and market different products, yet they are integrated. For beef, the production segment in Mongolia would include herders acting as seedstock producers (high quality breeding animals), commercial cow-calf producers (to produce cattle that eventually go to a feedlot), yearling/stocker operators that raise young cattle until they are ready to go into a feedlot, and feedlots that fatten cattle. The processing segment would include abattoirs (slaughterhouses) and meat-processing facilities and wholesalers. A major concern for any meat-related business is how meat can be produced, processed, and marketed most efficiently.

This report looks at the technical, financial and market feasibility of developing a new approach to the livestock value chain in Bayantumen soum. The TA Team investigated all aspects of the meat value chain in the target area, including gender and socio-economic dimensions. The analysis was done in a step-wise fashion, examining each segment of the value chain: young stock production, supplementary feeding, meat processing and end markets. It is closely related to the feasibility assessment of the community-scale slaughterhouse provided in Deliverable 4.1, which should be considered a sister report.

2 Methodology

Multiple methods were used to conduct the feasibility study and develop the business models. These included:

1. **Literature and Data Review:** Published reports on the meat sector, livestock value chains, business conditions, fodder production and other related topics were reviewed.
2. **Consultations:** Meetings were held with sector actors at the national, aimag and soum level.
3. **Site visits:** Site visits were conducted to all stages of the livestock value chain at various locations between Ulaanbaatar and Bayantumen soum.
4. **Data Analysis:** National data on production, productivity and trade and other pertinent topics were analyzed. Localized and enterprise specific information was collected. Production costs and productivity indicators were reviewed with stakeholders. Livestock and feeding productivity indicators were compared to international standards.
5. **Participatory approaches:** Stakeholder consultations were held with both NEAARC and the soum key stakeholders. This included a review of sites and the feasibility criteria, verification of assumptions and costs, and a review of the results of the analysis. Information on the study was provided in a transparent way through meetings and the sharing of reports.
6. **Development of the Business Models:** Business models were developed based on the analysis. The business models could be scaled up through Green Climate Fund (GCF), Global Environment Facility (GEF), International Finance Corporation (IFC) and/or other programs.

The analysis took a demand-driven, value-chain approach emphasizing new markets for younger, higher-quality cattle and sheep. Within the value-chains for beef and sheep, there various production stages, each which can be undertaken by either private or cooperative activities. The business models examine the overall business strategy and the ownership options for each link of the value chain. Decision criteria focus on:

1. Readiness: are the natural resources, infrastructure, market channels and human resources (skills and knowledge) in place to grasp the opportunity.
2. Gross Margin Analysis: is the activity financially feasible
3. Capital investment: the capital investment is required to start and operate the enterprise as well as the human resources requires (management, marketing, skilled labour)
4. Riskiness: the types and levels of risks facing the enterprise.

Slaughterhouse Site Selection: In Deliverable 4.1, a "site-neutral" approach was used to compare the pros and cons of a central and a remote (bagh) facility location, include the analysis of the on-grid and off-grid options, against a set of objective feasibility criteria. The two sites assessed included one at the soum center and a remote" site at NEAARC. Rather than giving a simple "yes/no" answer regarding the feasibility of a specific side, a graduated approach was used that indicated i) feasibility or readiness at the current time, and ii) the potential to achieve feasibility in the future. Recommendations and a pathway to feasibility were provided.

2. Methodology

Site specific, analysis should be completed when investment money has been identified and detailed documentation must be prepared for financing and environmental impact assessment (EIA), which is beyond the scope of the current TA.

The decision support tool for slaughterhouse feasibility is provided in Deliverable 4.1.

Decision Support Tools for Value Chain Assessment: A matrix of feasibility criteria was drafted that includes:

1. Market opportunities: Export, urban (Ulaanbaatar), regional and local.
2. Natural resources: The availability or potential availability for livestock feed (pasture, natural hay, grain, green fodder) and water.
3. Livestock health: Animal health, traceability, disease free zones, sanitary/phytosanitary requirements (SPS), food safety and Hazard Analysis and Critical Control Points (HACCP)
4. Livestock genetics: Improved genetics and breeding management.
5. Infrastructure and equipment: Land, power, water, production/storage facilities, handling equipment, vehicles, roads (on site; to market)
6. Management and human resources: Management, marketing, production (feedlot, plant), food safety and HACCP.
7. Environmental issues: Safeguards and monitoring regarding slaughterhouse and feedlot wastes.
8. Economics: Potential returns.

The general approach to illustrated in Figure 1.

Figure 1: Multi-Criteria Approach to Value Chain Feasibility

Market/Technical	Financial	Business Strategy
MARKET **PRODUCTION SYSTEM** - feed and water - livestock and breeding - animal health, traceability, food safety, HACCP **INFRASTRUCTURE & EQUIPMENT** **HUMAN RESOURCES** - Management, marketing - Production - Food safety/HACCP **ENVIRONMENTAL** - Safeguards, Monitoring	Can the business make a profit? Is there enough investment capital? Is there enough operating credit? Can you manage the financial risks caused by changes in input and market prices?	Type of ownership? (private/coop) Marketing management Value system coordination - distributors, processors, herders and farmers communicate and coordinate Scale - sufficient volume to access markets and compete on price Value-added traits - location ("Dornod meat"), attractive "story" about the product and/or producers, organic certification Production system - "push"– produce then find a buyer - "pull" – find a buyer then produce Relationship with the customer - Need to have a good understanding of your customer base.

A scoring grid was developed to assess readiness and feasibility for each criteria. The 1-5 scoring grid (Table 1) matches the grid used in the slaughterhouse feasibility analysis in Deliverable 4.1.

Table 1: Scoring Grid for Value Chain Feasibility Analysis

Criteria Fulfillment - Current Condition		Criteria Fulfillment - Likelihood of Achieving	
Complete	5	Easily	5
Most	4	Possible	4
Partial	3	Uncertain	3
Low	2	Hardly possible	2
Very Low	1	At present stage not possible	1
None	0	Not possible	0

The complete DSS is shown in Table 2. To illustrate how the scoring system is used, the current conditions for primary production of sheep and cattle by herders is assessed. In Bayantumen soum, the basic resources (pasture, water) and infrastructure (shelters, wells) are in place but there are limitations in the amount of supplementary feed that is produced. Export systems score very low because of market access issues stemming from livestock disease, the absence of disease-free zones and weaknesses in traceability, SPS and HACCP systems. Management and technical knowledge need to be improved, especially regarding the environment and marketing. Overall, returns to herders are low.

In Table 2, the “future possible” scoring has not been completed. This is done in the body of the report where the value chain assessments are reported.

2. Methodology

Table 2: Decision Support Tool – Value Chain Development

Criteria	Current System		Young Stock Sales		Backgrounding		Feedlot		Slaughterhouse	By-Product Sales	Further Processing
	Sheep	Cattle	Sheep	Cattle	Sheep	Cattle	Sheep	Cattle	Mixed		
MARKET											
Export	1	1									
UB / other provinces	4	4									
Local	5	5									
FEED AND WATER											
Water and water wells	4	4									
Pasture	4	4									
Hay	3	3									
Green fodder – planted	2	2									
Concentrate feed	2	2									
LIVESTOCK HEALTH											
Animal Health	3	3									
Traceability	2	2									
Disease-free zone	0	0									
Sanitary-Phyto Sanitary -export	1	1									
Food Safety Systems/HACCP	1	1									
BREEDING											
Methods	3	3									
Improved genetics	2	2									
INFRASTRUCTURE & EQUIPMENT											
Land	3	3									
Power	2	2									
Water											
Buildings (production, storage)	4	4									
Production & handling equipment	4	4									
Vehicles	4	4									
Roads (onsite, to market)	3	3									
MANAGEMENT & HUMAN RESOURCES											
Management Skills	3	3									
Marketing Skills	2	2									
Production Skills (feedlot/plant)	3	3									
ENVIRONMENTAL											
Safeguards	2	2									
Monitoring	2	2									
ECONOMICS											
Potential Returns	2	2									

Legend:						
Current Conditions:	Non 0	Very Low 1	Low 2	Partial 3	Most 4	Complete 5
Likelihood of Achieving:	Non 0	Not now 1	Hardly 2	Uncertain 3	Possible 4	Easily 5

3 Opportunities and Target Market

3.1 The Community Based Slaughterhouse Concept

In Deliverable 4.1 Meat Plant Feasibility Study, the design of a community-based slaughterhouse was developed. The design allows for a limited capital investment, the use of traditional technology as far as possible, inexpensive, low-maintenance equipment and efficient use of electricity and water. Cooling facilities are included. While simple in design, it allows for enhanced hygiene level with better product shelf life. Staff and management requirements are minimized. The slaughterhouse is intended to be located close to herders with distribution of product to the local or domestic market. To ensure a year-round supply of livestock for slaughter, a feedlot should be established. This multi-species plant would have the capacity to slaughter 50 sheep or an equivalent mix of sheep and cattle. For this analysis, a mix of 40 sheep and 2 cattle per day was used. The plant could slaughter 10,000 sheep and 500 cattle operating 50 weeks per year. This would produce 200 mt of mutton and 100 mt of beef per year. The feasibility assessment showed that the two proposed locations each had relative strengths and weaknesses but could meet the basic technical requirements for site selection. The critical factor for success rests in ownership and management capacity and capacity to withstand external risks. Detailed analysis is provided in Chapter 4.

3.2 Market Analysis

3.2.1 Overview of Supply and Value Chain

The meat supply chain includes a range of stakeholders, territories, and distance: herders (involved in herding, feeding, rangeland, water supply, shelters, vet service, transport and on-foot driving); processors (inspection, processing, freezing, storing, deboning, sorting, and packaging); and logistic suppliers (transport, store sales and serving consumers). Products from processing facilities have the advantage of being able to be sold on the global market and generate income through both domestic and international marketing. Meat of various livestock and animal origin are the main sources of income for herder households. Herders supply meat and live livestock to the centralized markets as follows:

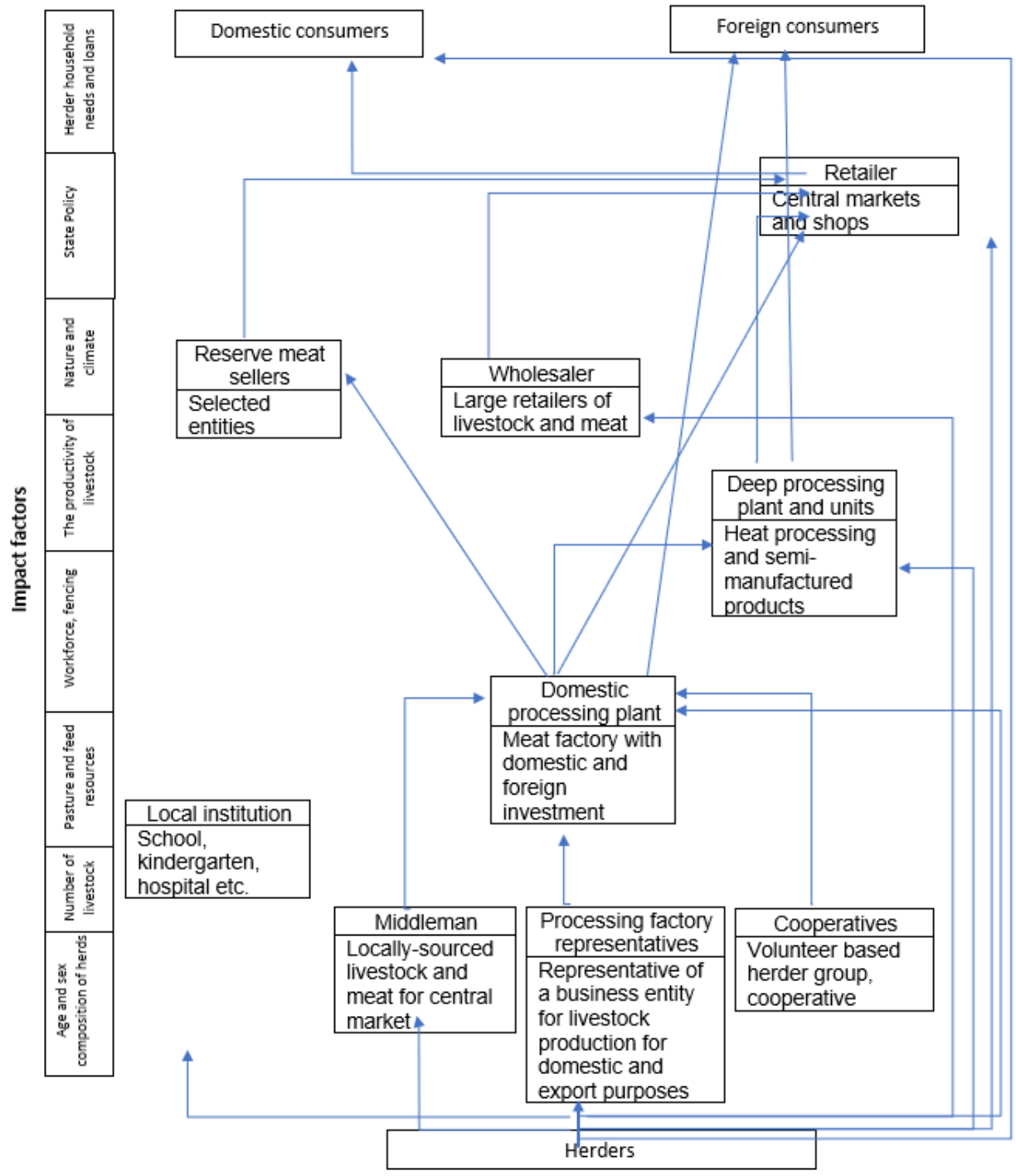
1. Sell live animals: Herders supply fattened livestock to the nearest markets during the fall and winter. Livestock is sorted by their type and ages and sold to intermediaries (middleman) or end users. This method has the advantage of preventing product quality changes during shipping as well as extending its shelf life. However, it can also have negative effects such as reduced prices and slower sales.

2. Traditional slaughter: Most animals are slaughtered by traditional method and carcasses brought to the soum, aimag or other centralized markets. Several problems exist with this method: i) no veterinary and intestinal examinations are carried out on the livestock slaughtered for food; ii) it is not possible to detect its origin or traceability; iii) slaughter locations do not meet modern requirements; iv) meat hygiene is inadequate as there is no washing or cleaning; v) it is not possible to cool, freeze or store the meat according to standards; and vi) it is not possible to meet the requirements for delivery or transportation to urban centres or consumers.

3. **Delivery to slaughterhouses:** A small number of herders have livestock slaughtered and meat processed in the abattoir and then go through many steps to reach end users.

The meat supply chain in Mongolia is illustrated in Figure 2.

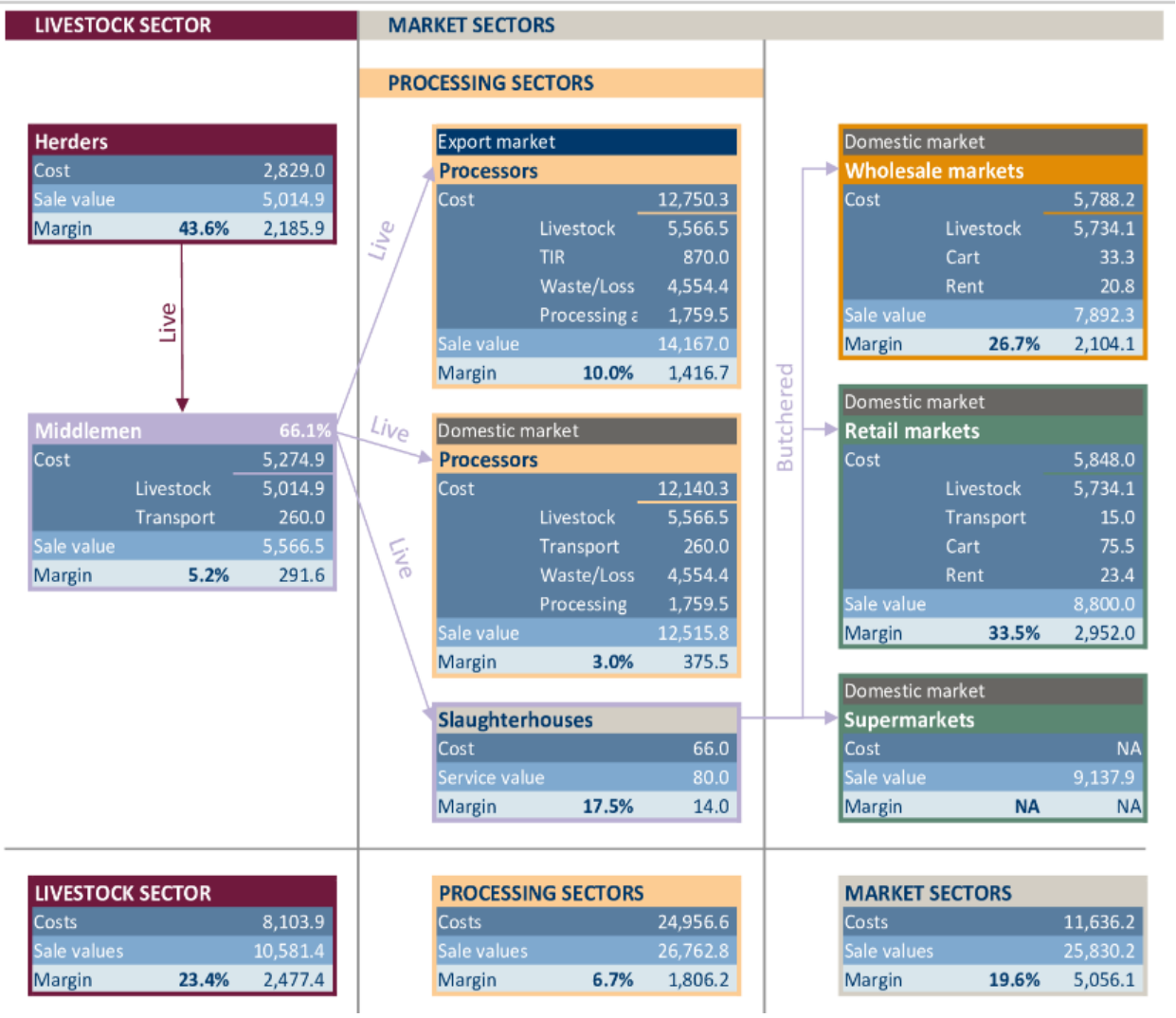
Figure 2: Meat Supply Chain



In the current system, herders receive a small share of the value of meat. Primary production costs include feed, veterinary medicine and service, fencing, hired herders, slaughtering costs (MNT 25,000 for a three-year old male yielding a 160 kg carcass or 156.3 MNT/kg), depreciation and basic living expenses. Costs to the middleman include the cost of the live animal, transportation, loading and unloading and preparing the meat. Wholesaler costs include the cost of the carcass or meat product, in-town shipping, operating permits, loading and unloading charges, weighing costs and parking fees. Retailer costs include the purchase price from the wholesaler, operating permit fees, the rental fee of the counter, the loading and unloading charges and the weighing costs.

Table 3 shows the margins within and between the sheep meat value chain. Processors selling in the domestic market work with a 3 percent margin while slaughterhouses achieve a 17.5 percent margin on slaughter services. The margins between the domestic processing and the wholesale/retail prices average 19.6 percent but the spread can be as much as 33.5 percent.

Table 3: Detailed Value Chain Analysis – Sheep Meat Bone-In (values in MNT)



Source: UNCTAD https://unctad.org/system/files/official-document/ditccominf2021d10_en.pdf

3.2.2 Meat Processing Sector

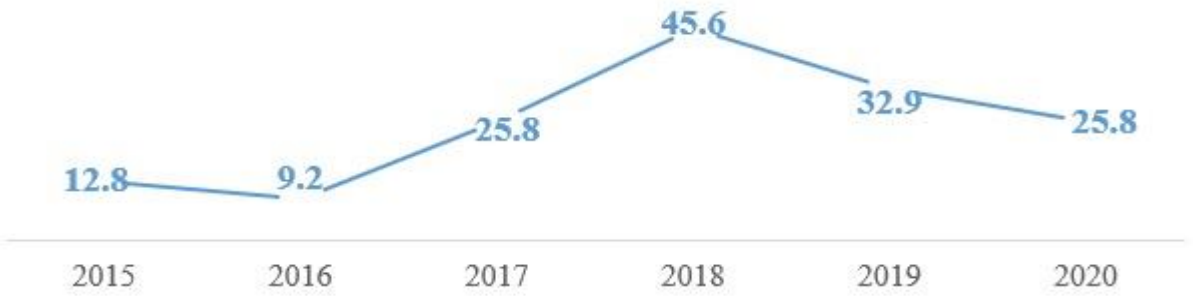
Meat is a strategic staple food for general use in the domestic market and has the potential to be a major export product. Table 4 presents Mongolian meat production levels from 2016-2020[1]. Only a fraction of meat production is carried out in processing factories, as shown in Figure 3. By 2020, 3.4 percent of the total meat production were processed by factories.

Table 4: Meat Production, Mongolia 2016-2020

No.	Types of livestock	Unit	2016	2017	2018	2019	2020
1	Cattle	'000 mt	92,4	97,7	126.6	114.7	158,5
2	Sheep, goats	'000 mt	193,1	207,5	236,3	258,1	343,1
3	Goats	'000 mt	0,6	0,5	0,6	0,6	0,3
Total		'000 mt	**400,0**	**426,1**	**515,2**	**545,0**	**744,5**

Source: National Statistical Office (NSO)

Figure 3: Meat Produced in Slaughterhouses, 2015-2020 ('000 mt)



Source: National Statistical Office (NSO)

Industrial slaughtering is important to increase employment in the meat sector and to raise the value of products so they can compete in both domestic and foreign markets. With greater volumes through industrial slaughter, new technologies and innovations can be introduced and the reputation and profits are increased. As of 2016, 48 meat processing factories were formally registered in Mongolia, in the following regions:

- Western: 17 (Khovd 3, Bayan-Ulgii 6, Uvs 3, Zavkhan 4, Gobi-Altai 1).
- Khangai: 10 (1 each in Arkhangai, Bayankhongor, Khuvsgul, Bulgan, Uvurkhangai, Bulgan and Uvurkhangai and 5 in Orkhon).
- Central: 16 (Ulaanbaatar 9, Darkhan 2, Tuv 1, Selenge 2).
- Eastern: 5 (Sukhbaatar 2, Khentii 2, Dornod 1).

[1] *Махны үйлдвэрлэл - ХХААХҮЯам (mofa.gov.mn)*

Of these 48, one operates at 80% capacity, five at up to 50% capacity and four at up to 30% while 27 operate at only 20% capacity or less. Another 14 are inactive[2]. In recent years there has been an increase in the number of meat processing facilities, especially those designed for the heat treatment/thermal processing required to export to many countries because of Mongolia's livestock disease status.

While there has been a rapid rise in the number of slaughterhouses and meat processing facilities, many do not comply with national and international standards or required equipment, technology and human resources. Table 5 shows the number of factories that meet the requirements of importing countries, as verified by experts, certified as eligible to export meat.

Table 5: Mongolian Slaughterhouses Meeting Export Requirements

№	Type	Number of factories	Operational factories	Certified for export
1.	Slaughterhouses	48	22	31
2.	Thermal processing factories	120	60	4
3.	Sorting and deboning factories	15	6	0

Source: National Value Chain and Finance Expert's report of "Promoting Dryland Sustainable Landscapes and Biodiversity Conservation in the Eastern Steppe of Mongolia" project, 2018

3.2.3 Overstocking and Low Offtake Rates

Mongolia's livestock herd has grown from 26 million in 1990 to 67 million in 2021. Traditional livestock management practices, preferences against consuming young stock, attitudes about livestock as wealth and self-insuring against weather disasters by holding "extra" livestock all contribute rapidly growing livestock numbers. Typically, the herd includes many older, non-breeding animals resulting in a low percentage offtake (slaughter) from the herd annually. Offtake as a percentage of total herd size was estimated (Table 6). There were no region-specific statistics available for this calculation, thus the state data was used. Using 2017 as an example, only 21% of the herd was slaughtered (24% for sheep; 18% for cattle). Because of the lack of supplementary feeding and pasture degradation, carcass weights are low (Table 7) and in decline. By comparison, offtake rates for cattle in Canada and sheep in Australia are typically about 32% (ranging from 30 – 35%) with average carcass weights of 340 kg for beef and 22 kg for sheep.

Table 6: Estimate of Annual Livestock Slaughter as a Percentage of Herd Size, 2017

Livestock Type	Livestock Population ('000 hd)	Annual Slaughter ('000 hd)	Offtake %
Horse	3,939.8	463.4	12
Cattle	4,388.5	802.7	18
Camel	434.1	33.4	8
Sheep	30,109.9	7,091.8	24
Goat	27,346.7	5,714.5	21
Total	66,219.0	14,105.8	21

Source: NSO data and consultant's calculations

[2] *National Value Chain and Finance Expert's report of "Promoting Dryland Sustainable Landscapes and Biodiversity Conservation in the Eastern Steppe of Mongolia" project, 2018*

Table 7: Estimate of Annual Meat Preparation and Unit Yields

Livestock type	Total Meat Production ('000 mt)			Carcass Yield (kg/hd)			
	2015	2016	2017	2015	2016	2017	Average
Cattle	*93,2*	92.4	97.7	128	128	122	126
Sheep	*220.9*	193.1	207.5	16	17	16	16
Goat							
Total	***314.1***	**285.5**	**305.2**				

Source: NSO data and consultant's calculations

The potential for export markets is often projected based on increasing livestock numbers and current, low offtake and carcass yields. This projected meat production growth is shown in Table 8. Livestock numbers to grow to 93 million by 2024 – an unsustainable number on the pastures – producing 548,000 mt of meat annually.

Table 8: Projected Livestock and Meat Production 2019-2024, Current Herd Expansion and Productivity

Type	Livestock ('000 hd)		Offtake Rate (3-year average)	Annual Slaughter ('000 hd)		Carcass Wt. kg/hd	Annual Meat Production ('000 mt)	
	2019	2024		2019	2024		2019	2024
Horse	4,186	5,664	11%	460	623	120	55.2	74.8
Cattle	4,605	5,906	18%	847	1,087	126	106.8	136.9
Camel	495	718	8%	42	60	350	14.6	21.1
Sheep	32,719	46,067	25%	8,212	11,563	16	131.4	185.0
Goat	28,437	36,017	23%	6,427	8,140	16	102.8	130.2
Total	**70,441**	**94,370**		**15,988**	**21,472**		**410.8**	**548.0**

Source: NSO data and consultant's calculations

Mongolia's pastures cannot sustain the current levels of overstocking let alone additional growth in livestock numbers. Changing herd structure to increase offtake numbers and improving herd management to increase carcass yields can have a similar but more sustainable impact on meat production and export market development. Table 9 illustrates the potential impact of increased offtake rates and carcass yields on annual meat production. Improving cattle and sheep/goat productivity such that offtake rates match international standards and increasing carcass yields could result in as much meat production as the baseline projection for 2024 but with an 11% reduction in herd size relative to 2019 (62.8 million versus 70.4 million) and a 33% reduction in comparison to the 2024 projected herd size (62.8 million versus 94.3 million).

Table 9: Livestock Numbers Needed to Match 2024 Meat Projections with Improved Productivity

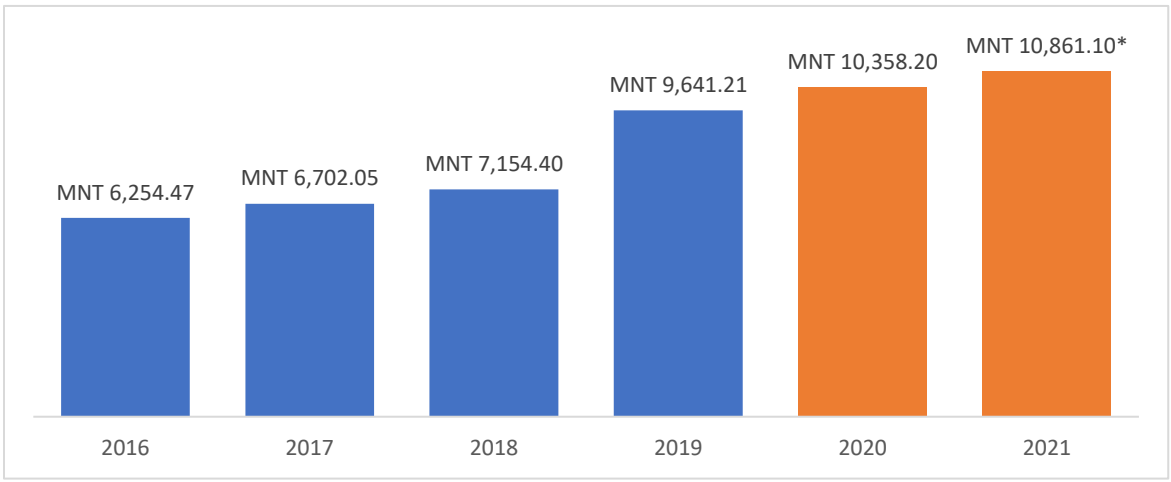
Type	Livestock ('000 hd)	Offtake Rate (3-year average)	Slaughter ('000 hd)	Carcass Wt. kg/hd	Meat Production ('000 mt)
Horse	5,664	11%	623	120	74.8
Cattle	2,139	32%	685	200	136.9
Camel	718	8%	60	350	21.1
Sheep	28,907	32%	9,250	20	185.0
Goat	25,437	32%	8,140	16	130.2
Total	**62,864**		**18,758**		**548.0**

Source: NSO data and consultant's calculations

3.2.4 Meat Prices and Government Interventions

While industrial processing of meat can improve food safety and quality, the increased production costs translate to higher retail prices which negatively affects the purchasing power of Mongolian consumers. Consumer prices for meat in urban centres such as Ulaanbaatar have increasing steadily since 2016 with negative impacts on consumer purchasing power and food security (Figure 4).

Figure 4: Annual Average Meat Price, Ulaanbaatar, (MNT/kg)



** - Price for the first quarter of 2021.*
Source: derived from NSO Data; ADB Managing Food Insecurity During COVID 19

In 2021, meat processing facilities prepared up to 20,000 tonnes of meat to be stored for consumption in Ulaanbaatar, Erdenet, Darkhan and aimag centres under the Reserve Stock Meat government-run program. This is roughly equivalent to the annual consumption needs of 6% of Mongolia's population (3.3 million people and 102 kg meat consumption/year) but most of the total meat processed in industrial factories each year. During the seasonal slaughter period, slaughter facilities operate at full capacity with positive impacts on revenue and jobs creation. Meat is frozen and released into the market during the late winter, early spring period when fresh meat is scarce and prices spike. The Government sets the maximum price for reserve meat and meat processing facilities received a subsidy or incentive of MNT 500-100 for sorting, packaging and delivering meat.

While this system ensures a certain quantity of meat in the market and a lever for managing prices, it has several issues. The meat provided is considered low quality after several months of cold storage and the artificially low price distorts the market for higher quality product. This can be a disincentive for meat processors to operate and invest in new technologies. The system is expensive to run in terms of subsidies, incentives, and inspection costs.

It would be more effective and efficient to address the food security issue with target income supplements for vulnerable families in need and leave the private sector to respond to the market signals sent by late winter price spikes. A better use and targeting of government subsidies would be to incentivize investment in year-round feeding and slaughter. Prices could be stabilized by providing a larger and steady supply of industrially produced meat year-round with related improvements in establishing disease free zones (DFZs) and increasing the capacity of storages and warehouses. This would have additional benefits in supporting export development and facilitating a decrease in total herd size back towards pasture carrying capacity.

3.2.5 Trends in Consumer Demand

Mongolian consumers have no tradition or culture of consuming meat processed in factories; rather they prefer meat slaughtered traditionally. For thousands of years, Mongolian have slaughtered animals in traditional ways and consumed fresh meat. They have tended to criticize factory-processed meat as being over-cleaned, of poor taste, and bones cut by saw and not separated and sorted traditionally. Hence, Mongolians often still buy meat slaughtered traditionally.

However, the situation has been changing in the last few years, so it is it important to use the media to advertise the safety of meat processing facilities and how they produce safe and healthy food, to increase public awareness, provide understanding to policy makers, improve government support and inspection and create the most conducive legal environment. Meat processors also need to meet public demand and requirements, including consumer tastes/interests of consumers, add produce types and improve quality.

3.2.6 SWOT Analysis

A Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis was completed on the key stages of the livestock and meat production and trade. The analysis is presented in Tables 10, 11 and 12, below.

Table 10: SWOT Analysis of Livestock and Meat Production

Strength	Weakness
1. Extensive expertise and experience in pastoral animal husbandry. 2. Experienced and skilled workforce with animal husbandry. 3. The rapidly growing network of roads enables products to be delivered to markets within a short period of time without a change in the quality. 4. Majority of the herders have their own fences and barns.	1. Decrease in young generation herders. 2. Pasture degradation increased due to the growth of livestock numbers and the limited seasonal moves. 3. Higher risks of natural disasters due to lesser opportunity of natural hay harvesting. 4. Meat production is active only in cold seasons due to lack of proper storage means. Not able to take advantage of spring price rise due to lack of storages. 5. Price of hide and by-products dropped.

Strength	Weakness
	6. Agricultural and fodder production is not developed in the region; thus fodder is scarce and costly. 7. Animal selection has been neglected, as a result animal productivity is declined. 8. Due to water scarcity, some pastures are depleted. 9. Large investment needed for raising production, intensifying livestock and technological innovation, but funding sources are limited and low. 10. Cooperation with by-product producing entities has not been established. 11. No coordination for migration and temporary grazing transitions, increasing pasture degradation.
Opportunity	**Threat**
1. There's a rising tendency of the demand of eco products in the market. 2. Under the "Mongolian livestock" national program[3], measures to treat and disinfect livestock have started. 3. The government is applying a policy to increase the export of meat and meat products. 4. By commissioning of private and jointly owned storages, the government aims to decrease the seasonal effects of the meat and increase the economic efficiency using price rises.	1. Last few years, drug use for livestock has drastically increased without proper monitoring, thus traces of the drugs remain in the meat. 2. Surface and groundwater resources decreased. 3. Due to the rapid climate change and increased heat, there's a tendency for surface water resources and plant species to decrease; and yields to lessen. 4. Meat consumption could be affected negatively due to decreased livestock fattening resulting from climate change and change in vegetation diversity. 5. Vaccines are used erratically by herders because of the lack of control over provision of veterinary services. 6. Continual outbreaks of epidemic livestock diseases in the region could cause restriction in the supply.

Table 11: SWOT Analysis of Livestock and Meat Trade Activities

Strength	Weakness
1. Traders can establish their own sales channel compared to herders. 2. Low operating costs per unit, due to a large volume of goods being transported at one time. 3. Buyers have a well-known and established supplier in the field of animal and meat preparation. 4. Product quality can be assessed. 5. Excellent growth of the road network has made it possible to deliver products to the markets in a short time and without any change in quality.	1. Specialized warehouses and vehicles are scarce 2. No vehicles intended for the carriage of meat during the warm season. 3. No stocking up in the hot season due to the lack of a dedicated storage tank and risk of change in product quality. 4. Do not take advantage of price increases in spring season due to the lack of storage. 5. Meat export restrictions have been tightened to protect the domestic market. 6. Despite the large investment required to expand operations and upgrade warehouses and vehicles, funding sources are limited and small. 7. Product price is not correlated with quality.

[3] *https://www.gafspfund.org/sites/default/files*

Opportunity	Threat
1. In the world market, the demand for organic products is growing. 2. The state has a policy of increasing exports of meat and meat products. 3. The state has begun to stock up on meat to limit the rise in meat prices, which has given it the opportunity to supply large quantities of meat to certain customers.	1. There are still outbreaks of livestock diseases in the region, which could limit supply.

Table 12: SWOT Analysis of Meat Production

Strength	Weakness
1. Adequate supply of raw materials per year. 2. Extensive experience gained from working many years in the field. 3. Valid work experience on current technology and equipment. 4. The rapidly growing network of roads has enabled to deliver and distribute products shortly without any changes in the quality. 5. It is possible to employ local representatives in the local area and the training unit.	1. No competitiveness capacity with foreign buyers. 2. Do not have technological capacity to conduct veterinary examinations and tests for export. 3. Meat factories do not get veterinary medicine residues, heavy metals, toxicological or bacterial tests done regularly on products and wastewater. 4. Delayed settlement due to financial insufficiency adversely affects livestock and meat preparation. 5. Use technology that is outdated and costly. 6. Investments in production and technology upgrades are needed, but funding sources are limited and low. 7. No mutually beneficial cooperation with the meat producers and business entities established. 8. Weak system to control livestock theft. 9. Difficulty in livestock transition due to increased livestock numbers, degraded pastures, and reduced water supply. 10. The cost is higher due to the auto transportation of a certain part of the prepared meat products. 11. Lean meat, offal and heads are not stored separately due to the unavailability of storage by animal type. 12. Meat products are limited in the region due to livestock diseases. 13. The skills of detaching and cutting the meat are insufficient when the buyer requests. 14. Small-scale of deep processing, products are limited. 15. Revolving fund is limited. 16. The cost of slaughtered livestock in the factory is higher than slaughtered livestock by hand. 17. Non-compliance with the state standard of meat sorting or cutting; no price differentiation by cuts.

Opportunity	Threat
1. Demand for eco-products is expected to grow in the world market. 2. The government is pursuing a policy to increase exports of meat and meat products. 3. The meat demand of Mongolian livestock is increased in the neighboring countries.	1. Due to the neglect of the control of veterinary drug usage, prepared meat products may contain drug residues, heavy metals, toxicological or bacteriological traces; may get banned. 2. There is a risk of export embargoes due to livestock diseases. 3. The state has poor control over the activities of foreign invested entities.

3.2.7 Summary of issues

The following challenges and difficulties have been observed in the meat industry in recent years. It includes:

- Livestock diseases outbreaks which limit export market access.
- Goat herds that have poor quality and poor meat yield have increased.
- Livestock genetic quality and the output per unit of livestock is declining.
- Herders focus on increasing livestock numbers rather than livestock intensification.
- Livestock numbers are increasing rapidly, leading to pasture degradation and desertification.
- There has been no efficient strategy to improve the meat processing system.
- Domestic processing plants are still struggling to compete in the market due to lack of operating capital to purchase livestock and process meat.
- China invested primary processing plants have been operating in Emeelt, Nalaikh and other rural areas. They have already established their own units everywhere and purchase large quantities of livestock and meat from suppliers based on their financial advantages. Because of this, domestic meat factories cannot compete with them.

It is vital to devote attention to increasing meat prices by primary processing, sorting, deboning and packaging. Intermittent processing negatively affects processing facilities that operate on a seasonal basis when staff remain idle for some time. Full-scale meat processing is significant in stabilizing factory operations and staff engagement. A clear example is shown in a case study of Makh Market LLC, where sorting, deboning and heat treatment increases profit margins by 20- 30%, reduces transport costs, widens the variety of choice for consumers and increases consumer satisfaction by supplying safe and healthy food.

3.3 Target Markets

3.3.1 Competitive and Collaborative Environment

The major local competitor is Dornod Meat, a large-scale industrial plant with capacity of 150-200 large animals using western-style methods and 800-1000 small stock/day using HALAL slaughter methods. They currently slaughter for the government reserve program but plan to export 2000-3000 tons of meat and meat products annually. They have recently installed thermal processing to support exports. Since they are focussed on different end markets (export, government reserves) may not be a direct competitor.

Dornod Meat presents some collaborative opportunities. They provide custom slaughter for herders and middlemen who then deliver the carcasses to Khaan Khuun and others for further processing. Dornod Meat is planning a feedlot adjacent to the slaughterhouse that would have 18 pens and areas for both beef and sheep. Several hectares have been allocated and two wells are already on site.

Khaan Foods LLC (Dornod Branch) produce 1500 mt/year which is 50% of their capacity. The plant supplies 10% of the meat product in Dornod while 30 to 40% of their production goes to Ulaanbaatar. Supply is 90% sheep and goat and 10% cattle. Issues include the seasonality of livestock supply, animal health issues and sheep carcasses not meeting their 20 kg requirement. The plant provides support to herders by advancing payments to vets for services and then deducting the cost from payment for the carcass. They have a policy to buy meat directly from herders and hope to decrease sales from middlemen from the current level of 80% down to 50% or 60%. They think the plant in Bayantumen could be feasible and would have no problem penetrating the market at its intended scale. It would provide Khaan Khuun an avenue to purchase carcasses directly from herders and they would consider investing in it. They now collaborate with other plants to source carcasses. Khaan Khuun piloted a higher quality/safe meat product, but the small market did not justify the increased costs. Instead, they will develop new processed, semi-processed and chicken-based convenience products (buuz, dumplings).

Feedlots and feedlot/slaughterhouse complexes exist between Dornod and Ulaanbaatar with established end markets in Ulaanbaatar. They have an ongoing need to quality feeder cattle. These include:

- MCS, Hentii aimag: A 5,000 head feedlot will open in late 2022. The feedlot is fully integrated with crop production, providing all of the feedstuffs required. Slaughter will begin using mobile units, which provides the flexibility to add capacity or contract in the future.
- Jargalkhan Soum, Hentii aimag: A new slaughterhouse with capacity for 1,500 sheep and 350 cattle per day will open in 2023. A planned feedlot would have an annual capacity of 15,000 sheep and 9,000 cattle. The company has produced sausage in Ulaanbaatar for 13 years. The slaughterhouse/feedlot complex will secure their supply chain and provide export market diversification. The location was selected based on access to major highways, the availability of land, feed and water and access to livestock.
- Bayandelger Meats: This plant supplies sells eMart and is planning their own shop to market top quality products. They are a vertically integrated operation with a feedlot, their own breeding stock and cropland as well as business relationships with local crop and livestock producers. They are open to additional partnerships with other livestock suppliers.
- Lavai: The company was established a food market in 2017. The absence of well-developed supply chains makes it difficult to work in the meat sector. There is very strong competition in Ulaanbaatar, especially from the Khujit market where herders take their livestock. Their strategic advantage is that they follow all regulatory and food safety standards and market under their own brand label. They are developing a feedlot to control production and food safety standards at every stage. They currently use custom slaughter but want to establish their own slaughterhouse using a mobile unit.

3.3.2 Meat Export

Bayantumen soum is in Dornod province which borders with China and Russia. These markets are very close compared to Ulaanbaatar, which is 650 km to the west. The export market is being pursued by meat companies and supported by national programs and international donor projects.

However, because of the weak animal health systems, infectious diseases such as Foot and Mouth Disease (FMD) are not under control and borders close each time there is an outbreak. The instability of export markets makes any investment targeted at them extremely risky. Export markets also require a high level of coordination and communication with other actors in the value chain (importers, distributors). This would require skills and expertise that may not be in the local area or would have to be hired at considerable cost. Competitiveness in the export market would require the ability to supply minimum order sizes and certain quality specifications on a consistent basis. To keep transaction costs low on a cost/kg of meat sold, high volumes would be needed. Given the seasonality of supply, this could be a major constraint.

While export markets should not be ruled out in the long term, they are not considered a feasible target market for the start-up of a small community-based plant. Furthermore, the small scale plant designed for the community level does not meet the international requirements of export markets because the various stages of slaughter and processing are not separated into different rooms.

3.3.3 Domestic Meat Markets

The official population of Choibalsan is 38,537 while Ulaanbaatar has a population of 1,645,000. Using daily consumption levels of red meat in these two locations reported in 2020[4], the potential market shares of the Bayantumen slaughter plant were calculated (Table 13). The Bayantumen plant production would represent 8% of the Choibalsan market but less than 1% of the Ulaanbaatar market.

Table 13: Red Meat Consumption Levels and Bayantumen Market Share

Red Meat	UB	Dornod	*Average*
gr/day[a]	320.2	284.0	*302.1*
kg/year	117	104	*110.3*
Population, capital city	1,645,000	38,537	
Daily consumption (mt)	526.7	10.9	
Annual Consumption (mt)	192,256	3,995	
Bayantumen Market Share	0.2%	8%	

a: Diet and Nutrition Status of Mongolian Adults, May 2020.
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7284332/table/nutrients-12-01514-t001/?report=objectonly

The domestic market consists of several segments across multiple locations. Each has opportunities and constraints for the start-up operation (Table 14). As the marketing becomes more complex, either in terms of geographic location or the level of value-added, the cost of product increases, either because of increased transportation, increased marketing and market development costs or a combination thereof.
The remote location of Bayantumen soum relative to the major premium meat markets in Ulaanbaatar impacts transportation logistics and costs as well as communication and coordination between the local

[4] *Diet and Nutrition Status of Mongolian Adults, May 2020*

community and various other actors in the value chain, especially outside of Dornod aimag. Dornod's remoteness from Ulaanbaatar makes transportation a major expense. Livestock is produced in every province between Dornod and Ulaanbaatar and those producers would be able to land their product into the Ulaanbaatar market with lower transportation costs. This means that any "traditional" quality meat would be unlikely to compete on price against these closer provinces.

Table 14: Summary of Market Opportunities for Bayantumen Soum

Product Type	Market Segment /Distribution		Dornod	Ulaanbaatar	Comments
			Increasing Transport & Marketing Costs		
Traditionally slaughtered carcass	Direct to consumer	Increasing Production and Marketing Costs	√		Not likely to be cost competitive outside Dornod
	Small shops		√		
	Further processors		√		
Inspected carcass from hygienic meat plant	Direct to consumer		√	√	Opportunities increase but without a better-quality carcass, transportation costs will make it hard to be competitive.
	Small shops		√	√	
	Supermarkets		√	√	
	Further processors		√	√	
	Restaurants		√	√	
	Institutional use		√	√	
Carcass broken to major cuts	Direct to consumer		√	√	Cut differentiation is not common in Dornod. Market exists in Ulaanbaatar but requires more marketing effort.
	Small shops		√	√	
	Supermarkets		√	√	
	Further processors		√	√	
	Restaurants		√	√	
	Institutional use		√	√	
Further processed (sausage, dumplings etc.)	Direct to consumer		√	√	Markets exist in both locations. Requires brand development and additional capital. Competitive market with lower cost manufactures at scale.
	Small shops		√	√	
	Supermarkets		√	√	
	Further processors			√	
	Restaurants		√	√	
	Institutional use		√	√	
	Direct to consumer - online		√	√	
Carcass or cuts based on value-added traits ("Dornod meat", "green", etc.)	Direct to consumer		Maybe	Maybe	Limited market in Dornod. Market in Ulaanbaatar not well developed and willingness to pay not well defined. Needs strong marketing program.
	Small shops		No	No	
	Supermarkets		Maybe	Maybe	
	Further processors		No	No	
	Restaurants		No	No	
	Institutional use		No	No	
	Direct to consumer - online		Maybe	Maybe	

This implies that Bayantumen should seek to produce a higher quality product to allow them to sell at a higher price in the market. This will allow them to differential their product from the average meat product and help to offset the higher per unit production costs they will have as a small plant with limited scale. This, however, requires a more sophisticated marketing program and product control back to producers to ensure that the product quality claim can be delivered on.

Figure 5: End Markets for Bayantumen Slaughterhouse

END MARKET

Number of people to consume the meat from Bayantumen: 4000 people or 1000 households

Possible Markets

Choibalsan:		**Ulaanbaatar:**	
Distance	12 km	Distance	650 km
Population	38,537	Population	1,645,000
% of market	8%	% of market	0.2%
Opportunities: Access to chain stores, restaurants Easier to develop customer relations Sell carcasses direct to Khaan Khuun		**Opportunities:** Higher incomes, changing diets More restaurants wanting young meat Market "Bayantumen" Brand and story	
Issues: Very small high-income segment Prefer traditional or convenient to "eco"		**Issues:** Cost of transportation Distribution channels Harder to maintain customer relations	
Risk: Can't compete on price against traditional and industrial slaughter		**Risk:** People not ready to pay for younger or "eco" meat. Can't compete on price with small scale and long distance.	

4 Building Resilient Livestock Supply Chains

4.1 Current Situation: Supply-driven, Vulnerable Price-Takers

Herder households are primarily smallholders vulnerable to poverty and the impacts of climate change. As price-takers, they sell livestock as individual producers into a highly seasonal market. Selling during the traditional fall slaughter season to middlemen means they usually receive seasonally depressed prices with little transparency in price formation. There are limited market options and returns to the household are low. The production system is based on an eco-system threatened by overuse and climate change. Feed supply is not reliable and there is limited knowledge and technical/extension support to manage feeds and feeding programs based on livestock nutritional needs. New marketing systems and business models are needed that will allow herders to: i) access stable markets for livestock and livestock products; ii) benefit from price differentiation for quality livestock; and iii) access the capacity investment and operating finance needed to invest in productivity improvements and climate change adaptation.

In Bayantumen soum, the average herd size in 2020 was 299 animals consisting of 46 horses, 36 cattle, 129 sheep, 87 goats and 1 camel. In Table 15, the revenue and profit generated by cattle and sheep in the typical herd is estimated. Sales are based on current practices and calving and lambing rates of 46% and 48% respectively in Mongolia[5]. Only native hay is feed and there are no feed purchases. The gross revenue is 10.3 million MNT (USD 3,938) with direct production costs of 2.9 million MNT (USD 1,092) leaving a gross margin of 7.5 million MNT (USD 2,856) or $238/month. Cashmere sales would add 2.6 million MNT revenue (USD 994) and increase gross income to 10.1 million MNT (USD 3,850) or $321/month. This estimate is in line with the average annual income of a herding household, which is estimated at 15.6 million MNT (around $5,000) from all sources of income in 2022[6]. Mongolia's poverty line is set at USD 5.50 /day[7] ($2007/year/person) or $8,000/year (USD 669/mo.) for a household of four people. This indicates that the average herder household is living at or below the poverty line.

Table 15: Gross Margin Analysis for Cattle and Sheep, Average Bayantumen Herd

Item	Description	Total (MNT)	Total USD (@ 2620)
REVENUE			
Cattle	2 steers, 3 open/cull cows	8,244,000	3,147
Sheep	10 sheep 30 months old, 7 ewes	2,099,328	801
Total		**10,343,328**	**3,948**
EXPENSES			
Feed - Purchased			-
Vet and Medicines		330,032	126
Marketing		780,000	298
Fuel - hay making		1,750,000	668
Total Production Costs		**2,860,032**	**1,092**
GROSS MARGIN		**7,483,296**	**2,856**
per month		623,608	238

[5] *Gantuya case studies 2017-2018*
[6] https://bne.eu/the-economics-of-herding-in-mongolia-248998/?source=mongolia
[7] https://www.macrotrends.net/countries/MNG/mongolia/poverty-rate

4.2 Future Possible: Quality Oriented, Resilient and Sustainable

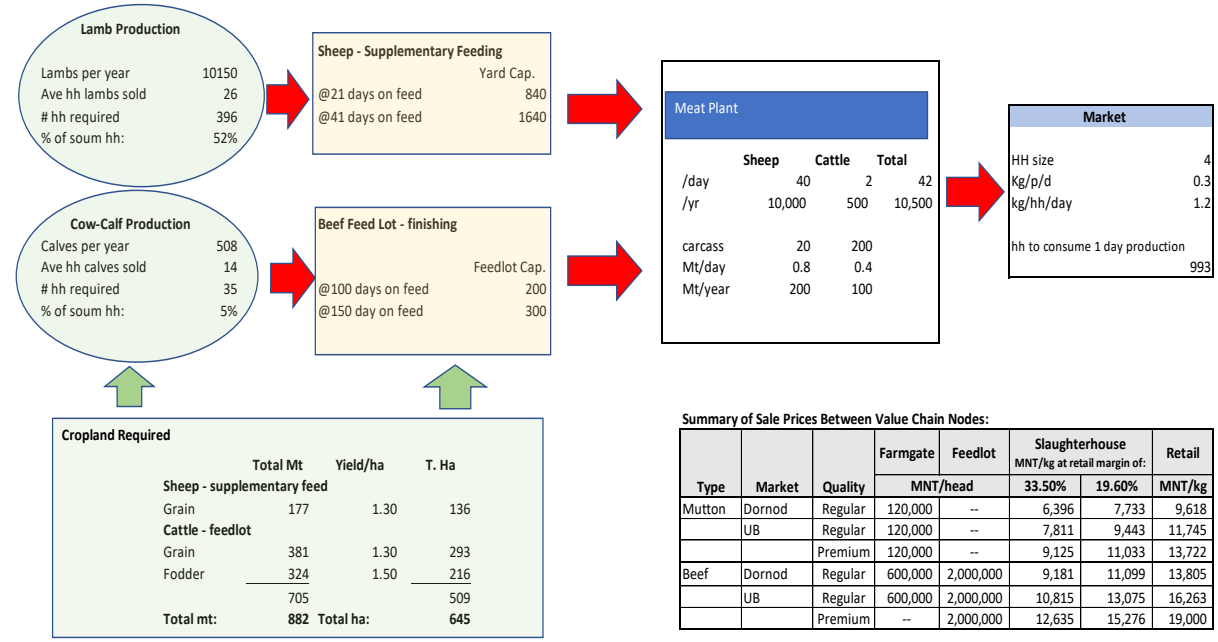
4.2.1 Re-imagining the Supply Chain

More profitable and sustainable livestock supply chains are needed to lift rural people out of poverty, ensure food security and protect the environment. Improved supply chains would consist of:

- Informed consumers driving the demand for higher quality and safe meat products, nutritious food, less food waste, animal welfare and climate-smart production.
- Meat slaughterhouses and further processors operating year-round at high level of capacity utilization that provides the market a stable supply of meat throughout the year and minimizes seasonal price spikes while supporting improved and more stable profits.
- Feedlots and backgrounding operations providing a year-round supply slaughter-ready livestock to slaughterhouses.
- Livestock producers selling a high proportion of young stock from high quality, healthy and productive breeding stock and practicing sustainable, regenerative pasture management methods that improve soil quality, enhance water retention and support biodiversity.
- Integration between the livestock and crop sector to provide a reliable and affordable supply of quality feedstuffs through the introduction of diverse crop rotations and climate smart agriculture practices.

Figure 6 illustrates how improved supply chains in Bayantumen soum could be established through integration with meat slaughtering and the establishment of feedlots and supplementary feeding. The system illustrated is based on the proposed community-based slaughterhouse and shows the product flows and resources required at each supply chain node.

Figure 6: A New Supply Chain for Bayantumen Soum



Summary of Sale Prices Between Value Chain Nodes:

			Farmgate	Feedlot	Slaughterhouse MNT/kg at retail margin of:		Retail
Type	Market	Quality	MNT/head		33.50%	19.60%	MNT/kg
Mutton	Dornod	Regular	120,000	--	6,396	7,733	9,618
	UB	Regular	120,000	--	7,811	9,443	11,745
		Premium	120,000	--	9,125	11,033	13,722
Beef	Dornod	Regular	600,000	2,000,000	9,181	11,099	13,805
	UB	Regular	600,000	2,000,000	10,815	13,075	16,263
		Premium	--	2,000,000	12,635	15,276	19,000

The meat plant would slaughter 40 sheep and 2 cattle per day during a five-day work week, 50 weeks per year. The plant would purchase 10,000 sheep and 500 cattle per year. With cattle on feed for an average of 125 days, a feedlot with a capacity of 250 head would be needed. If sheep received supplementary feed for 21 days, there would be approximately 840 on feed at any given time. Given the new herd structure described in the previous section, the lamb feeding program would involve 396 households selling 26 lambs per year, or 52% of the Bayantumen soum herding households. The feedlot would engage 35 households selling an average of 14 calves per year, or just 5% of the soum herding households. The supplementary feed requirements to support the slaughterhouse and feedlot value chain are 882 mt of grain and green fodder which can be harvest from approximately 645 hectares.

These numbers are all technically feasibility given the land resources, households, herd sizes and end market present. In the following sections of the report, the business and financial viability of each individual node in the new value chain are examined.

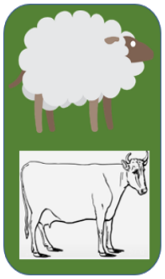
4.2.2 Producing Young Stock (Cow-calf, lamb farms)

Restructuring herds to have a greater percentage of breeding females and greater annual offtake can be an effective approach to decreasing total livestock numbers so that pastures can be rehabilitated. The better availability of pasture and feedstuffs for the smaller number of livestock being overwintered can improve survivability and productivity. Little capital investment is required. The changes to be made are primarily in marketing and management. The potential increase in herder household revenues from the increased annual sales of livestock can be significant.

New skills and techniques are needed, including culling strategies, breeding management and new marketing skills. Access to improved breeding stock is required as is extension support to help herders learn and adopt new practices. The key risks are associated with being able to consistently secure buyers who are wanting to purchase younger and improved livestock. This demand is most likely going to come from the emerging feedlot sector.

Figure 7: New Herd Structure

Resources	Critical Skills/Inputs	Key Risks	ESG
Land is adequate but pastures are degrading. Little new capital investment needed.	New herd management skills: - Culling - Breeding management - Improved breeding stock New marketing skills and/or coop.	Market for selling younger animals. Need access to feedlot: - Own - MCS - Bayandelger - Lavia - *Dornod Meat*	• Strong positive on pasture • Better climate resilience • Improved herder incomes • Greater inclusion in markets



Criteria	Now	Future
Market		
Feed and water		
Livestock health		
Breeding		
Infrastructure/Equip		
Human resources		
Environmental		

Complete 5	Most 4	Partial 3	Low 2	Very Low 1	Non 0

The environmental, social and governance benefits of this adaptation are numerous. There is a strong positive impact on the ability to return livestock numbers towards pasture carrying capacity. Allowing pasture to regenerate and having more feed available per animal being overwintered will decrease the risk of large animal losses during dzud, thus improving climate

resilience. Because of the increased annual sales, herders' incomes could increase significantly. Shifting to a quality product and be becoming more active actors in the value chain will improve market governance.

Using the decision support criteria (Figure 7) to assess the viability of adopting the herd structuring strategy, we can see that the current market for young, quality animals is low. The feed and water required is partially in place, but more supplementary feeds should be added into local crop rotations. Livestock health is very low, as multiple infectious disease outbreaks have occurred in the past year. The infrastructure and equipment required is mostly in place. Human resources are partially in place with new knowledge and skills required in the topics previously mentioned. The environment is current in a low condition and at risk to overgrazing and climate change, which could threaten the viability of the existing production system in the future. However, looking at the medium term, all these conditions could improve as the feedlot sector continues to expand, government programs for livestock health are improved, improved breeds become more available. In short, the risk of not acting is probably greater than the business risks taken on by becoming early adopters of a new livestock management and marketing approach.

In the following example, the average herd in Bayantumen soum is restructured. With increases in sales numbers only and no increases to productivity (weaning rates), total revenue would increase by 20%. However, with more feed available per animal animals overwintered, along with better herd management, breeding programs and animal health, weaning rates are assumed to increase to 75%. In this case, annual sales of cattle increase from 5 to 17 while annual sales of sheep increase from 17 to 31. The number of cattle to overwinter declines from 35 to 25 while the number of sheep to overwinter declines from 130 to 91. Total revenue increases from 10.3 M MNT to 17.2 M MNT, an increase of 66%.

Table 16: Improved Herd Structure and Revenue Impact, Average Bayantumen Herd

Current Structure, Sales and Revenue		Improved Structure, Sales and Revenue	
CATTLE (wean 46%)		CATTLE (wean 75%)	
Breeding Cows	16	Breeding Cows	22
On pasture in Aug	45	On pasture in Aug	45
# in December	35	# in December	25
Total # Sold	5	Total # Sold	17
Total Revenue, Cows	8.244 M	Total Revenue, Cows	13.483 M
SHEEP (wean 48%)		SHEEP (wean 75%)	
Breeding ewes	70	Breeding ewes	52
On pasture in Aug	163	On pasture in Aug	128
# in December	130	# in December	91
Total # sold	17	Total # sold	31
Total Revenue, Sheep	2.099 M	Total Revenue, Sheep	3.701 M
TOTAL REVENUE	10.343 M	TOTAL REVENUE	17.183 M increase 66%

In 2018, Mercy Corp[8] conducted a study of the potential costs and benefits of Mongolian herders shifting to a quality vs quantify focused approach to beef cattle production. Their findings showed that it can take up to two years to make the transition after which, the benefits included:

- increases in net profit through increased calf sale prices.
- higher sale prices and income per calf due to increased calf weight at sale time and improved quality of the animal (good beef breed genetics).
- better livestock survival due to improved cattle condition when winter begins.
- more diversity in income streams by selling more calves for breeding and for meat.
- Improved access to loans and loan terms from banks due to increased profits and asset values.

4.2.3 Supplementary Feeding of Cattle for Consistent Quality and Supply

(1) Beef Backgrounding

When backgrounding cattle, calves are kept over one winter and sold the next year. Supplementary feed is provided through the winter to ensure that they do not lose weight. Without having to regain weight in the spring and summer, calves can be ready for market in their second summer (< 24 mo.). This practice is common in countries where feedlots are well established and need a steady supply of cattle coming into the feedlot throughout the year.

Bayantumen soum has adequate land for hay and supplementary feed production by incorporating livestock feed crops into rotation with wheat and by establishing new stands of perennial forages on marginal cropland. If herders began to produce the hay and supplementary feeds themselves, equipment purchases would be necessary. If existing crop farmers added forage crops and feed grains to their rotations, production could be done with existing equipment. Improved storage for livestock feeds would be needed as current methods results result in high losses in quality.

New skills would be required by herders and farmers in feed production, improved methods of cutting, handling and storing feeds, livestock nutrition and feed and ration formulation. New marketing skills for selling younger stock would be needed. As with the previous scenario, the key risks are in being able secure a steady market for young stock as the feedlot sector is developing. Some individual herders with haymaking equipment may take up this activity.

Using the decision support criteria, the results for backgrounding cattle is very similar to the previous scenario for restructuring herds but with more capital investment and another layer of new knowledge and technical skills required by herders.

[8] *Improving Beef Cattle Production: The financial implications of shifting from quantity to quality-focused beef cattle production, Mercy Corp, April 2018*

Figure 8: Beef Backgrounding

Resources	Critical Skills/Inputs	Key Risks	ESG
Land for hay / fodder production. Equipment. Storage.	New herd management skills: - Feeds and feeding - Marketing New marketing skills and/or coop.	Access to feedlot to sell cattle: - Own - MCS - Bayandelger - Lavia - *Dornod Meat*	• Improved herder incomes

Criteria	Now	Future
Market		
Feed and water		
Livestock health		
Breeding		
Infrastructure/Equip		
Human resources		
Environmental		

Complete 5	Most 4	Partial 3	Low 2	Very Low 1	Non 0

(2) Beef Feedlots

Using the IFC guidebook for feedlots, a 250 head feedlot would be required to supply the Bayantumen slaughterhouse with a steady supply of finished beef cattle[9]. This would take two hectares of land for the feedlot itself with an additional 40 ha of irrigated land for corn silage production and 100 ha of unirrigated land for other feed grain production. In 2019, the total capital investment required for the feedlot only was 440.5 million MNT. If the feedlot operator did not already have land and equipment for crop production, an additional 836.6 million MNT would be needed, taking the total capital investment required to 1,277 million MNT. Adjusting for inflation since 2019, the feedlot model costs have been increased 27%. Adjusted to 2022 values, the total cost of the feedlot and crop equipment would be 1,624 million MNT (USD 620,000) while the cost of the feedlot only would be 560 million MNT (USD 214,000).

Beef feedlots are capital intensive operations requiring high levels of skill in livestock management, animal nutrition, feeds and feeding, animal health and marketing, amongst others. Good record keeping and constant monitoring of input and output prices is essential to make the feedlot financially viable. Feedlots face several risks. Market risks are substantial because of the variability of slaughter cattle prices, feeder prices and grain prices which can cause huge swings in the profitability from one lot of cattle to the next. The manager must also deal with operational livestock health risks. Because of the high capital investment and ongoing high levels of operating credit required for the purchase of calves and feed, financial risk is also high.

[9] *Developing Feedlots in Mongolia, A Guidebook for Herders, Feedlot Owners and Managers, Investors and Policy Makers, IFC, 2019 used for Feedlot Start-Up Costs and Parameters*

Figure 9: Beef Feedlots

Resources	Critical Skills/Inputs	Key Risks	ESG
250 hd = 2 ha Capital Invest (2022) Feedlot only: • 560 m MNT Crop 40 ha irrigated and 100 dryland: • 1,064 m MNT Total: • 1,624 m MNT	• Animal nutrition and feeding • Animal health • Marketing • Record-keeping • Risk management • Livestock handling and feeding • Financial management	High risk business • Price risk – cattle and feed • Operational risk • Livestock disease risk • Profits vary greatly from year to year as cattle and grain prices change	Positive: • Less pressure on pastures • organic fertilizer Negative: • risk of water contamination by manure • High water use: 30-75 l/hd/d or 7500 – 18750/d @ capacity

Criteria	Now	Future
Market		
Feed and water		
Livestock health		
Breeding		
Infrastructure/Equip		
Human resources		
Environmental		

Complete 5 | Most 4 | Partial 3 | Low 2 | Very Low 1 | Non 0

Feedlots can have the positive environmental benefits of taking pressure off pastures and creating a source of organic fertilizer for crop production. They are also a potential source of ground water contamination through manure run-off, which makes proper design and manure management important. Feedlots also require access to a large quantity of high-quality water, as cattle will consume 30 to 75 liters per head per day. The Bayantumen feedlot would need 7,500 to 18,750 liters of water per day. Therefore, feedlot site selection and design to ensure animal health and welfare and environmental safety is very important.

Using the decision support system, (Figure 9) the feedlot sector has no infrastructure or equipment in Bayantumen currently. Related criteria for market, feed and water, livestock health and knowledgeable and skilled human resources are low or very low. Improved genetics are available in the aimag but are not commonly used by herders. In the future, the market and availability of improved genetics are expected to develop. Local feed supplies may take longer to develop given the capital investment required, the low productivity of Dornod soils and the impact of climate change on precipitation patterns. Through government, project and private sector extension, the knowledge of skills herders and feedlot operators could be improved.

In Table 17, the financial returns to the feedlot are modelled under two price scenarios for finished cattle. In Case A, the final sales price is 5,000 MNT/kg for a 400 kg animal. In Case B, the final sales price is 4,000 MNT/kg for a 400 kg animal. All other variables are unchanged: calves are purchased at 200 kg for 3,000 MNT/kg and feed costs are 500 MNT/kg, 75% of the capital investment is borrowed at commercial rates of 18 percent. Half of the calf cost and feed costs are financed by operating credit at 18 percent. In Case A, the profit per animal is 224,874 MNT (USD 71) and total feedlot profits over the year are 120.6 million MNT (USD 35,191). Debt repayment is possible in this scenario. In Case B, a loss of 127,918 MNT per head (USD -37) is realized with total losses of 63.0 million MNT (USD -18,000) over the year and the debt cannot be repaid.

Table 17: Feedlot Profits – Highly Price Sensitive (at commercial interest rates of 18%)

	Case A		Case B	
Full Farm Analysis	**/hd sold**	**Full Capacity**	**/hd sold**	**Full Capacity**
Number of calves in:	1	500	1	500
Death loss	1.5%	1.5%	1.5%	1.5%
Calves sold	1	493	1	493
Total cost of calves	600,000	300,000,000	600,000	300,000,000
Total sales revenue	2,000,000	985,000,000	1,600,000	788,000,000
Cost of Gain				
Total Feed Costs	694,444	342,013,889	694,444	342,013,889
Total Other Costs	216,411	106,582,301	216,411	106,582,301
Total Selling Costs	9,800	4,826,500	9,800	4,826,500
Total Cost of Gain:	920,655	453,422,690	920,655	453,422,690
Total Variable Cost (calf cost + cost of gain)	1,520,655	748,922,690	1,520,655	748,922,690
Gross Margin = Sale Value – Total Variable Cost	**479,345**	**236,077,310**	**79,345**	**39,077,310**
Fixed Costs	207,263	102,076,927	207,263	102,076,927
PROFIT/LOSS before tax	**272,082**	**134,000,383**	**- 127,918**	**- 62,999,617**
Tax	27,208	13,400,038	-	-
PROFIT/LOSS after tax but before debt and living	**244,874**	**120,600,345**	**- 127,918**	**- 62,999,617**
(USD)	*71*	*35,191*	*- 37*	*- 18,383*
After debt repayment (over 5 years)	**76,823**	**37,835,269**	**- 295,969**	**- 145,764,692**
(USD)	*22*	*11,040*	*- 86*	*- 42,534*

Assumptions	**Feeder calf**	200 kg * 3000 MNT	200 kg * 3000 MNT
	Finished calf	400 kg * 5000 MNT	400 kg * 4000 MNT
	Grain price	500 MNT/kg	500 MNT/kg
	Fodder price	500 MNT/kg	500 MNT/kg

If the soft interest rate of 3 percent available through some agriculture development funds is obtained, the feedlot profitability and ability to absorb price shocks improves. In Case A, the profit per animal after debt repayment would be 285,847 MNT (USD 83). The loss at a sale price of 4,000 MNT/kg would be reduced to 74,153 MNT/head (USD -22) with a total loss of 36.5 million MNT (USD -10,657).

The introduction of feedlots can help to reduce pressure on pastures by providing a market for young stock and they will be an important step in developing more quality focussed and efficient meat value chains. Because of their high capital and knowledge requirements and multiple risks, it is most likely that they will be started by investors who can access capital at affordable rates and/or farms that already have the land and equipment base and seek to develop another market for their grains by feeding cattle.

At the level of individual herders and small farmers, the development of feedlots might follow that of Western Canada and the United States in the previous century, where mixed farms (crops and livestock) would build a small feedlot with enough capacity to feed their own calves (30 to 100 head) using feed grains, forages, and crop residues from their own farming operations. At this scale, the feedlot provides integration between crop and livestock on a single farm, diversifies markets and risks for the household and utilizes available labour over the year.

4.2.4 Supplementary Feeding of Sheep

The Bayantumen slaughterhouse would require a steady supply of 40 sheep per day throughout the year of a standard weight and grade to produce a 20 kg carcass. With a typical feeding period of 40 days, a single

feedlot would need to have up to 2,000 sheep on feed at anytime. Based on consumption 4.7 liters/head/day, up to 9,500 liters of water would need to be provided daily.

The literature review on the economics of sheep feeding showed that intensive feeding of sheep had marginal viability in both Australian feedlots and Mongolian feeding trials. In the Australian case, large scale feedlots (5,000 to 10,000 head) were modelled, and the conclusion was that "Feedlotting profitability based on input values analyzed and regardless of feedlot size or throughput is generally negative or low" and is most strongly influenced by the spread between feeder and finished lamb prices versus the ration cost[10]. In Mongolia, intensive feeding trials on sheep were conducted by the Centre for Policy Research under the Bank Livestock and Marketing Project (LAMP). In the Mongolian pilot, lambs went through an adaption period on pasture to become accustomed to supplementary feeds and then were fed in an enclosed area (feedlot). This resulted in a net loss of 6,294 MNT/head leading to the conclusion that, "Feeding Mongolian lambs is not justified economically, and it is better to maximize weight gain on pastures to keep lambs' comparative advantage of being green and free-range product with unique taste."[11]. A third study, conducted in Inner Mongolia in 2016, fed 6-month-old lambs for a 75-day period (15 day introductory, 60 days intensive) with grass, native hay or a hay/concentrate combination. Lambs fed a hay/contrate ration had lower financial returns than grass fed lambs while lambs fed a ration of only native hay had negative financial returns[12].

Several risk and management factors that must be considered if feedlotting sheep. First, between 5 and 10 percent of lambs will not adapt to the feedlot and will need to be removed for early sale or returned to pasture[13]. Ration costs are significant, and all feeds should be tested for energy and protein. Lambs need to go through an introductory period (usually about 14 days) before entering the feedlot. Based on Australian standards, they will consume about 15-20 kg of feed without any significant weight gain during this introductory period followed by the feeding phase when a feed conversion ration of 6:1 can be expected, requiring 60 kg of feed to produce 10 kg of gain[14]. Risks include lamb deaths, lambs not adapting to feed, poor growth rates and changes in prices for feed and finished lambs. Managing these risks requires adequate, quality feed supplies at secured prices, good feedlot and animal health management and forward contracting with slaughterhouses at set prices. Many services (feed testing, feed formulation, forward contracting, etc.) are not readily available in Mongolia currently, which makes it more difficult for producers to control these risks.

By comparison, supplementary feeding sheep on pasture using grain, hay or silage can have positive benefits with a much lower capital investment requirement[15]. It has the benefits of:

[10] *Investor-Ready Sheep Feedlot Project, A Sheep Industry Business Innovation Project, Department of Agriculture and Food, WA, Geoff Duddy, June 2017*
[11] *A pilot feeding of Mongolian lamb under the WB-supported Livestock and Agricultural Marketing Project (LAMP), Center for Policy Research, 2015*
[12] *Growth performance, carcass characteristics, and meat quality of Mongolian lambs fed native grass or hay with or without concentrate on the Inner Mongolian Plateau, Authors: Shuai Du, Sihan You, Jian Bao, Gentu Ge, Yushan Jia jys_nm@sina.com, and Yimin Ca, Canadian Journal of Animal Science 29 January 2020 https://doi.org/10.1139/cjas-2019-0126*
13 Feedlotting lambs, Department of Primary Industries, NSW Government, July 2016.
[14] *ibid*
[15] *ibid*

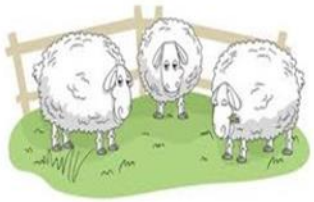
- reducing grazing pressure on pastures
- improving utilisation of existing pasture
- provides the sheep's energy and protein requirements to prevent weight loss
- improves production of meat or wool[16].

Supplementary feeding can be for lambs only (creep feeding) whereby, adult sheep are excluded from the supplementary feeding area (a pen or a pasture with a small opening that only a young animal can get through). This approach was piloted by the Food and Agriculture Organization (FAO)/Worldwide Fund for Nature (WWF) Eastern Steppes project in 2022 with promising early results.

Supplementary feeding on pasture requires feed purchases or cropland and related equipment, fencing and feed storage. Adequate water in the feeding area will be required. Providing supplementary feed to enable the marketing of younger animals would require new skills in feeds and feeding. New marketing skills would be required to access the market for younger animals.

Figure 10: Sheep Feeding Alternatives

Resources	Critical Skills/Inputs	Key Risks	ESG
Feed on Pasture: Land for fodder. Equipment, feed storage, fencing. **Feedlot:** Capacity 1600-2000 Water: 4.7l/hd/day = 7,571 - 9,464 l/day	New herd management skills: - Feeds and feeding - Marketing New marketing skills and/or coop.	Studies in Mongolia and abroad show sheep feedlots to have marginal returns. Supplementary feeding on pasture can get sheep to market weight faster with less risk. *More info is needed*	• Improved herder incomes •



Criteria	Now	Future
Market		
Feed and water		
Livestock health		
Breeding		
Infrastructure/Equip		
Human resources		
Environmental		

Based on the available information and using the decision support criteria (Figure 10), Bayantumen soum is currently more prepared to take on supplementary feeding on pasture, either creep feeding young lambs in accelerate growth or backgrounding weaned lambs to maintain weight over winter, than in feedlots. This approach could be adopted by herder households with a relatively low capital investment. The average Bayantumen soum herder household would have about 26 lambs to feed. A marketing coop at the soum level could be formed to aggregate animals for group sale. The same coop could organize transport to

[16] *Supplementary feeding and feed budgeting for sheep, Department of Primary Industries and Regional Development, Government of Western Australia, 2022*

market and the bulk purchase and transport of feedstuffs. This coop could be affiliated with pasture users' groups.

More information on the productivity of Mongolia sheep breeds and cross breeds and their performance under feeding programs is needed to project potential financial returns. There is a strong need for Mongolian research institutes, projects and industry associations to conduct practical feeding trials to provide this information to industry.

4.2.5 Value-added through meat processing

The proposed multi-species slaughterhouse has a capacity of 50 head of sheep or equivalent mix of sheep and cattle. For this analysis, a mix of 40 sheep and two cattle per day were used. Operating five days per week, 50 weeks per year would require purchases of 10,000 sheep and 500 cattle per year. With improved carcass weights of 20 kg sheep and 200 kg for cattle, total meat production would be 200 mt of mutton and 100 mt of beef per year. A land base of 1 hectare would be required.

Using the simplified floor plan and equipment approach proposed in Deliverable 4.1, the investment cost required for this plant would be roughly 524 million MNT (USD 200,000). An alternative to local construction would be to import a mobile slaughterhouse, which would include the building structure and fixtures. The civil works, cooler, small tools and vehicles would still need to be purchased (Table 18). Cost estimates have been based on discussions with stakeholders, internet research and expert opinion of the team.

Table 18: Investment Costs for a Community Scale Slaughterhouse

Investment costs	Description	MNT/unit	USD/unit
Civil works	water, power, sewerage/waste	131,000,000	70000
Facility			
- Building & utilities	Large block construction	196,500,000	75,000
- Equipment	Lift, hooks/rails	26,200,000	10,000
- Cooler	Units range up to 10,000 USD	26,200,000	10,000
- Other (small tools, clothes)	small tools, clothes, furniture etc.	26,200,000	10,000
Total Facility		**275,100,000**	**105,000**
Vehicles	cooler truck, used	65,500,000	25,000
Total Vehicles		**65,500,000**	**25,000**
TOTAL COSTS		**471,600,000**	**200,000**

The slaughterhouse could run at capacity with a staff of three to five butchers. Mongolian regulation states that the company must have a veterinarian on staff for inspections. A driver would be required for product delivery. Management and administrative staff would include an operations manager with experience running a meat plant and an accountant/office manager. These positions could be combined. If the management/admin staff do not have marketing experience, a marketing person may also be required. Total staff would range from seven minimum to a maximum of ten.

The critical skills required to make the plant successful include meat production and slaughterhouse management, marketing, food safety and hygiene and butchering. The main risks facing the plant are, in no particular order: i) the scale is too small to be profitable or price competitive; ii) difficulty accessing higher value markets because of the remote location in Dornod and or the lack of marketing skills; iii) operational risks related to securing a steady supply of livestock 12 months per year; iv) finding and keeping skilled staff; and vi) food safety and animal health issues.

If the plant could be run profitably, the benefits would include employment for 7 to 10 people, potentially improved returns and incomes for herders, an increased number and transparency of market options for herders, and greater participation in high value livestock markets by herders from Bayantumen.

Figure 11: Slaughterhouse

Resources	Critical Skills/Inputs	Key Risks	ESG
Land = 1 ha. Capital Invest: • Civil works • Building • Equipment • Vehicle(s) Total: • 594 million MNT • (USD 200,000)	• Management • Marketing • Food Safety and hygiene • Butchering	• Scale is too small to compete on price • Higher value markets are far away • Operational risk – supply of livestock, finding / keeping trained staff • Livestock disease	• 5 – 10 full time employees • Improved returns and incomes for herders • More transparent market • More inclusion in markets and benefits

Criteria	Now	Future
Market		
Livestock health		
Infrastructure/Equip		
Human resources		
Environmental		

Complete 5 | Most 4 | Partial 3 | Low 2 | Very Low 1 | Non 0

Using the decision support criteria (Figure 11), the current situation is only partially complete. There is a new market opportunity for hygienic, quality meat, but the infrastructure and human resources are incomplete. There are also environmental issues to be addressed because the markets for slaughter by-products and methods for handling wastes are undeveloped. Animal health status is very low, which affects quality and marketability. In the future, the market will continue to develop, although it may take years for high quality and branded meat products to take a major share of the market given traditional preferences and the lack of purchasing power of a large segment of the Mongolian population. Similarly, it may take years to develop the by-product markets and waste management systems. While there are many skilled butchers in Mongolia, developing and retaining staff with knowledge in new grades, cuts and food safety standards may continue to be a challenge.

In the following scenarios, the ability of the plant to run profitably under different market and financing conditions have been assessed:

- Retail/wholesale to slaughter price margins of 19.6 percent and 33.5 percent as indicated in the United Nations Conference on Trade and Development (UNCTAD) value chain report
- Interest rates of 3 percent and 18 percent annually and a repayment period of five years representing soft rates available under the SME program and average commercial rates.
- Capacity utilization of 100 percent and 80 percent, with 80 percent being the highest currently achieved in Mongolia.

Local Markets for Regular Quality Meat

The local market opportunity includes sales to retailers, local institutional sales and to local processors making dumplings and other prepared foods. The market for premium meat in Dornod is limited. This scenario was modelled assuming the sale of regular quality meat on a year-round basis. In this case, only 4,000 MNT/kg is paid for slaughter cattle (1,600,000 MNT/head).

If the retail margin on meat is 33.5 percent (i.e., the slaughterhouse receives 66.5 percent of the retail price), the plant cannot reach breakeven even at 100% capacity and 3 percent financing. Losses before debt repayment are 143 million MNT (USD 41,844) and the operation defaults on its loan.

If the retail margin on meat is 19.6 percent, the scenarios improve but are still highly sensitive to the rate of capacity utilization. With commercial financing of 18 percent and 100 percent capacity, the plant could return an after-tax profit of 194 million MNT (USD 56,673), repay its debt and have 91 million MNT (USD 26,673) remaining. However, if capacity utilization fell to 80 percent, losses of 291 million MNT would accrue (USD – 85,000) and the debt would be unpaid.

At retail margins of 19.6 percent and financing at 3 percent, the plant still cannot absorb the risk of low rates of capacity utilization. At 100 percent capacity, an after-tax profit of 264 million MNT (USD 76,923) is achieved with 161 million MNT (USD 46,923) remaining after debt repayment (Table 19). If utilization falls to 80 percent, a loss of 214 million MNT (USD 62,553) occurs and the operation defaults on its debt (Table 20). With secured sales contracts and possible investment and partnership from local processors and the soum government to ensure full capacity utilization, this model might be made viable. However, competition from larger scale plants with lower unit operating costs and direct-to-processor sales by other herders could easily undercut this market.

In this scenario, there is no premium paid to feedlots for fed cattle. As shown in the previous section, without such a price premium, the feedlot operations become unviable. While the plant may be able to source the 500 older cattle per year, it would provide no incentive for producers to feed or for herders to sell younger stock and alter their herd composition and size.

Table 19: Slaughterhouse Profits: Local Market, 100% Capacity, 3% Interest, 19.6% Retail Margin

PROFITABILITY	MNT/UNIT	DESCRIPTION	UNITS	TOTAL	USD
REVENUE					
Mutton	7,733	MNT/kg * kg per year	200,000	1,546,574,400	**451,291**
Beef	11,099	MNT/kg * kg per year	100,000	1,109,922,000	**323,876**
Sheepskins with wool	2,700	MNT/skin * skins per year	10,000	27,000,000	**7,879**
Hides and skins > 2 meters	3,688	MNT/hide * hides per year	500	1,844,000	**538**
Total Revenue				**2,685,340,400**	**783,583**
EXPENSES					
Live animal Costs					
Sheep	120,000	MNT/hd * head per year	10,000	1,200,000,000	350,160
Cattle	1,600,000	MNT/hd * head per year	500	800,000,000	233,440
Total				**2,000,000,000**	583,601
Labour	5	plant workers	800,000	*4,000,000*	*1,167*
	1	vet	800,000	*800,000*	*233*
	1	driver	800,000	*800,000*	*233*
	1	Manager/Accountant	1,500,000	*1,500,000*	*438*
	0	Marketing	1,500,000	-	-
			Cost/mo	*7,100,000*	*2,072*
			Annual	**85,200,000**	24,861
Total Livestock and Labour:				**2,085,200,000**	608,462
Ratio to Total Revenue:		*(target = 60%)*			*78%*
Margin after Livestock and Labour				**600,140,400**	**175,121**
Operating costs					
power	12	months per year	500,000	6,000,000	1,751
water (pumping costs)	12	months per year	250,000	3,000,000	875
materials	5000	MNT/hd processed	10,500	52,500,000	15,320
waste disposal	49	MNT/kg waste	287,250	14,075,250	4,107
other ….				-	-
Subtotal				**75,575,250**	**22,053**
Ratio to Total Revenue:		(target = 20%)			*3%*
marketing	12	promo/advertising monthly	1,500,000	18,000,000	5,252
sales - delivery	100	km return * MNT/kg/km * T kg	0.49	14,700,000	4,289
training/food safety	12	training/compliance	500,000	6,000,000	1,751
other ….	12		500,000	6,000,000	1,751
Subtotal				**44,700,000**	**13,043**
TOTAL VARIABLE COSTS				**2,205,475,250**	**643,559**
GROSS MARGIN				**479,865,150**	**140,025**
Ratio to Total Revenue:					*18%*
FIXED COSTS					
Adminstration/office	5%	estimated at x% of revenue		134,267,020	39,179
Regulatory costs	1	license, etc	3,000,000	3,000,000	875
interest on debt	3%	on 75% of capital investment	514,050,000	15,421,500	4,500
depreciation	5%	of investment - 20 yr lifespand	685,400,000	34,270,000	10,000
other ….				-	-
TOTAL FIXED COSTS				**186,958,520**	**54,555**
TOTAL COSTS				**2,392,433,770**	**698,113**
PROFIT/LOSS BEFORE TAX				**292,906,630**	**85,470**
Tax	10%			29,290,663	8,547
PROFIT AFTER TAX				**263,615,967**	**76,923**
after tax return on investment				38%	38%
debt repayment	5	year repayment term	514,050,000	102,810,000	30,000
remainder after debt payment				160,805,967	46,923

Table 20: Slaughterhouse Profits: Local Markets, 80% Capacity, 3% Interest, 19.6% Retail Margin

PROFITABILITY	MNT/UNIT	DESCRIPTION	UNITS	TOTAL	USD
REVENUE					
Mutton	7,733	MNT/kg * kg per year	160,000	1,237,259,520	**361,033**
Beef	11,099	MNT/kg * kg per year	80,000	887,937,600	**259,101**
Sheepskins with wool	2,700	MNT/skin * skins per year	8,000	21,600,000	**6,303**
Hides and skins > 2 meters	3,688	MNT/hide * hides per year	400	1,475,200	**430**
Total Revenue				**2,148,272,320**	**626,867**
EXPENSES					
Live animal Costs					
Sheep	120,000	MNT/hd * head per year	10,000	1,200,000,000	350,160
Cattle	1,600,000	MNT/hd * head per year	500	800,000,000	233,440
Total				**2,000,000,000**	583,601
Labour	5	plant workers	800,000	*4,000,000*	*1,167*
	1	vet	800,000	*800,000*	*233*
	1	driver	800,000	*800,000*	*233*
	1	Manager/Accountant	1,500,000	*1,500,000*	*438*
	0	Marketing	1,500,000	-	-
			Cost/mo	*7,100,000*	*2,072*
			Annual	**85,200,000**	24,861
Total Livestock and Labour:				**2,085,200,000**	608,462
Ratio to Total Revenue:		*(target = 60%)*			*97%*
Margin after Livestock and Labour				**63,072,320**	**18,405**
Operating costs					
power	12	months per year	500,000	6,000,000	1,751
water (pumping costs)	12	months per year	250,000	3,000,000	875
materials	5000	MNT/hd processed	10,500	52,500,000	15,320
waste disposal	49	MNT/kg waste	287,250	14,075,250	4,107
other ….				-	-
Subtotal				**75,575,250**	**22,053**
Ratio to Total Revenue:		(target = 20%)			*4%*
marketing	12	promo/advertising monthly	1,500,000	18,000,000	5,252
sales - delivery	100	km return * MNT/kg/km * T kg	0.49	11,760,000	3,432
training/food safety	12	training/compliance	500,000	6,000,000	1,751
other ….	12		500,000	6,000,000	1,751
Subtotal				**41,760,000**	**12,186**
TOTAL VARIABLE COSTS				**2,202,535,250**	**642,701**
GROSS MARGIN				**- 54,262,930**	**- 15,834**
Ratio to Total Revenue:					*-3%*
FIXED COSTS					
Adminstration/office	5%	estimated at x% of revenue		107,413,616	31,343
Regulatory costs	1	license, etc	3,000,000	3,000,000	875
interest on debt	3%	on 75% of capital investment	514,050,000	15,421,500	4,500
depreciation	5%	of investment - 20 yr lifespand	685,400,000	34,270,000	10,000
other ….				-	-
TOTAL FIXED COSTS				**160,105,116**	**46,719**
TOTAL COSTS				**2,362,640,366**	**689,419**
PROFIT/LOSS BEFORE TAX				**- 214,368,046**	**- 62,553**
Tax	10%			-	-
PROFIT AFTER TAX				**- 214,368,046**	**- 62,553**
after tax return on investment				-31%	-31%
debt repayment	5	year repayment term	514,050,000	102,810,000	30,000
remainder after debt payment				- 317,178,046	- 92,553

Ulaanbaatar Market for Premium Meat

Premium meat markets emerging with the middle-class, expatriate and tourist populations, primarily in Ulaanbaatar, offer the opportunity for premium prices that can drive change within the domestic meat value chain. In the following scenarios, the slaughterhouse production is sold in Ulaanbaatar to premium supermarkets and the restaurant trade. An additional staff member focused on marketing and sales is added. Marketing costs increase to transport meat to Ulaanbaatar, an estimated roundtrip of 1400 km. Feedlot cattle providing a better-quality carcass are purchased at 5,000 MNT/kg (2,000,000 MNT/head).

At a 33.5 percent retail margin and 18 percent interest, the premium prices are sufficient to allow the plant to turn a profit (195 million MNT or USD 57,022) and repay debt if it runs at 100 percent capacity. This leaves 92.6 million MNT (USD 27,022) after debt repayment. However, if capacity falls to 80%, a loss of 334 million MNT (USD 97,465) is incurred and the operation defaults on its debt. If subsidized finance of 3 percent is obtained, profit after tax increases to 265 million MNT (USD 77,272) with 162 million MNT (USD 47,272) remaining after debt repayment. However, the subsidized interest does not provide a sufficient buffer against low-capacity utilization. If capacity use falls to 80 percent, losses of 267 million MNT (USD 74,965) occur and the operation defaults on its debt.

At a retail margin of 19.6%, revenues to the slaughterhouse improve significantly. At 18 percent interest and 100 percent capacity utilization, after-tax profits are 747 million MNT (USD 218,085) with 645 million MNT (USD 188,085) remaining after debt repayment (Table 21). This scenario can also withstand a lower capacity utilization. At 80 percent capacity, after-tax profits are 141 million MNT (USD 41,132), offering a 21% return on investment. After debt repayment, there is 38 million MNT (USD 11,132) remaining (Table 22). Any lower level of capacity utilization moves the operation in the loss position. Accessing subsidized interest will decrease annual interest costs from USD 27,000 to USD 4,500, improve profitability and allow the plant to operate at a marginally lower capacity rate. With 3 percent interest, the plant could operate at 77 percent capacity and return an after-tax profit of 119 million MNT (USD 34,839) with 16.6 million MNT (USD 4,839) remaining after debt repayment. Any lower capacity levels result in a loss.

Table 21: Slaughterhouse Profits: Premium Market, 100% Capacity, 18% Interest, 19.6% Retail Margin

PROFITABILITY	MNT/UNIT	DESCRIPTION	UNITS	TOTAL	USD
REVENUE					
Mutton	11,032	MNT/kg * kg per year	200,000	2,206,497,600	**643,857**
Beef	15,276	MNT/kg * kg per year	100,000	1,527,600,000	**445,754**
Sheepskins with wool	2,700	MNT/skin * skins per year	10,000	27,000,000	**7,879**
Hides and skins > 2 meters	3,688	MNT/hide * hides per year	500	1,844,000	**538**
Total Revenue				**3,762,941,600**	**1,098,028**
EXPENSES					
Live animal Costs					
Sheep	120,000	MNT/hd * head per year	10,000	1,200,000,000	350,160
Cattle	2,000,000	MNT/hd * head per year	500	1,000,000,000	291,800
Total				**2,200,000,000**	641,961
Labour	5	plant workers	800,000	*4,000,000*	*1,167*
	1	vet	800,000	*800,000*	*233*
	1	driver	800,000	*800,000*	*233*
	1	Manager/Accountant	1,500,000	*1,500,000*	*438*
	1	Marketing	1,500,000	*1,500,000*	*438*
			Cost/mo	*8,600,000*	*2,509*
			Annual	**103,200,000**	30,114
Total Livestock and Labour:				**2,303,200,000**	672,075
Ratio to Total Revenue:		*(target = 60%)*			*61%*
Margin after Livestock and Labour				**1,459,741,600**	**425,953**
Operating costs					
power	12	months per year	500,000	6,000,000	1,751
water (pumping costs)	12	months per year	250,000	3,000,000	875
materials	5000	MNT/hd processed	10,500	52,500,000	15,320
waste disposal	49	MNT/kg waste	287,250	14,075,250	4,107
other ….				-	-
Subtotal				**75,575,250**	**22,053**
Ratio to Total Revenue:		(target = 20%)			*2%*
marketing	12	promo/advertising monthly	1,500,000	18,000,000	5,252
sales - delivery	1400	km return * MNT/kg/km * T kg	0.49	205,800,000	60,053
training/food safety	12	training/compliance	500,000	6,000,000	1,751
other ….	12		500,000	6,000,000	1,751
Subtotal				**235,800,000**	**68,807**
TOTAL VARIABLE COSTS				**2,614,575,250**	**762,934**
GROSS MARGIN				**1,148,366,350**	**335,094**
Ratio to Total Revenue:					*31%*
FIXED COSTS					
Adminstration/office	5%	estimated at x% of revenue		188,147,080	54,901
Regulatory costs	1	license, etc	3,000,000	3,000,000	875
interest on debt	18%	on 75% of capital investment	514,050,000	92,529,000	27,000
depreciation	5%	of investment - 20 yr lifespand	685,400,000	34,270,000	10,000
other ….				-	-
TOTAL FIXED COSTS				**317,946,080**	**92,777**
TOTAL COSTS				**2,932,521,330**	**855,711**
PROFIT/LOSS BEFORE TAX				**830,420,270**	**242,317**
Tax	10%			83,042,027	24,232
PROFIT AFTER TAX				**747,378,243**	**218,085**
after tax return on investment				109%	109%
debt repayment	5	year repayment term	514,050,000	102,810,000	30,000
remainder after debt payment				644,568,243	188,085

Table 22: Slaughterhouse Profits: Premium Market, 80% Capacity, 18% Interest, 19.6% Retail Margin

PROFITABILITY	MNT/UNIT	DESCRIPTION	UNITS	TOTAL	USD
REVENUE					
Mutton	11,032	MNT/kg * kg per year	160,000	1,765,198,080	**515,086**
Beef	15,276	MNT/kg * kg per year	80,000	1,222,080,000	**356,603**
Sheepskins with wool	2,700	MNT/skin * skins per year	8,000	21,600,000	**6,303**
Hides and skins > 2 meters	3,688	MNT/hide * hides per year	400	1,475,200	**430**
Total Revenue				**3,010,353,280**	**878,422**
EXPENSES					
Live animal Costs					
Sheep	120,000	MNT/hd * head per year	10,000	1,200,000,000	350,160
Cattle	2,000,000	MNT/hd * head per year	500	1,000,000,000	291,800
Total				**2,200,000,000**	641,961
Labour	5	plant workers	800,000	*4,000,000*	*1,167*
	1	vet	800,000	*800,000*	*233*
	1	driver	800,000	*800,000*	*233*
	1	Manager/Accountant	1,500,000	*1,500,000*	*438*
	1	Marketing	1,500,000	*1,500,000*	*438*
			Cost/mo	*8,600,000*	*2,509*
			Annual	**103,200,000**	30,114
Total Livestock and Labour:				**2,303,200,000**	672,075
Ratio to Total Revenue:		*(target = 60%)*			*77%*
Margin after Livestock and Labour				**707,153,280**	**206,348**
Operating costs					
power	12	months per year	500,000	6,000,000	1,751
water (pumping costs)	12	months per year	250,000	3,000,000	875
materials	5000	MNT/hd processed	10,500	52,500,000	15,320
waste disposal	49	MNT/kg waste	287,250	14,075,250	4,107
other ….				-	-
Subtotal				**75,575,250**	**22,053**
Ratio to Total Revenue:		(target = 20%)			*3%*
marketing	12	promo/advertising monthly	1,500,000	18,000,000	5,252
sales - delivery	1400	km return * MNT/kg/km * T kg	0.49	164,640,000	48,042
training/food safety	12	training/compliance	500,000	6,000,000	1,751
other ….	12		500,000	6,000,000	1,751
Subtotal				**194,640,000**	**56,796**
TOTAL VARIABLE COSTS				**2,573,415,250**	**750,924**
GROSS MARGIN				**436,938,030**	**127,499**
Ratio to Total Revenue:					*15%*
FIXED COSTS					
Adminstration/office	5%	estimated at x% of revenue		150,517,664	43,921
Regulatory costs	1	license, etc	3,000,000	3,000,000	875
interest on debt	18%	on 75% of capital investment	514,050,000	92,529,000	27,000
depreciation	5%	of investment - 20 yr lifespand	685,400,000	34,270,000	10,000
other ….				-	-
TOTAL FIXED COSTS				**280,316,664**	**81,797**
TOTAL COSTS				**2,853,731,914**	**832,720**
PROFIT/LOSS BEFORE TAX				**156,621,366**	**45,702**
Tax	10%			15,662,137	4,570
PROFIT AFTER TAX				**140,959,229**	**41,132**
after tax return on investment				21%	21%
debt repayment	5	year repayment term	514,050,000	102,810,000	30,000
remainder after debt payment				38,149,229	11,132

Limitations of the Models

The models underscore the risk slaughterhouses face because of the seasonality of supply and the related impact on capacity utilization. The models have used 100 percent capacity utilization as the best-case scenario and 80 percent capacity for sensitivity analysis. However, the value chain information earlier in this report indicated that the best capacity utilization reported in Mongolia was 80 percent with most industrial slaughterhouses operating at less than 50 percent. Under these conditions, profitability and loan repayment would not be possible.

The models have used annual average prices for input and output variables. This is a generalized approach and does not consider management strategies that would capture seasonal price opportunities to maximize sales revenue or to purchase and stockpile feedstuffs at seasonally low prices. On the other hand, achieving the capacity utilization rates required to make the plant successful would require year-round sales contracts to retailers and restaurants which could limit the opportunity to lower production levels during seasonally low meat prices. Similarly, the model assumes that all feeds are purchased and does not consider the financial impacts of an integrated crop-feedlot operation.

The slaughterhouse models discussed have not included operating interest on livestock purchases. It assumes a rapid turnover of inventory self-financed by the operation. The additional of operating finance requirements would further decrease the expected returns under all scenarios.

Marketing costs related to selling premium meat to outlets in Ulaanbaatar may be underestimated. It is difficult to know how much a marketing and sales specialist able to develop contract and maintain business relationships would be paid. Other cost related to marketing which may be underestimated include the amount and cost of advertising and the full cost of deliveries (trucks, operating costs, driver related costs).

Published information on slaughterhouse operational and capital costs in Mongolia is limited. Furthermore, no business plan documents were available to the team that might have provided localized costs parameters pertinent to this specific business case. Therefore, several assumptions have been made regarding operating costs which should be improved and verified should a full feasibility study be carried out.

4.2.6 Feed Production

Dornod has 117,000 hectares of designated cropland of which 72,300 hectares were cultivated by 20 companies in 2019[17]. Khalkhgol soum accounts for 85 percent of the cropland. During the Soviet period, 11,000 hectares were cultivated under irrigation in Bayantumen soum. No irrigated land was reported in the soum in 2021.

Farms commonly practice a crop-summerfallow rotation, meaning they seed half of their land each year. Accordingly, the 2021 seeded area in Dornod was 34,711 hectares of which 4,000 were in Bayantumen soum. Bagh 4 reports 2,100 hectares of cultivated land, but only 700 hectares were seeded in 2021 (Table 23).

[17] https://www.ijset.net/journal/2598.pdf

The proposed slaughterhouse and related feeding programs would require about 645 hectares of cropland. This land is available within Bagh 4 with more accessible within the soum. Introducing feed crops and nitrogen-fixing forages in rotation would diversity crop revenue for farmers and provide benefits in terms of soil health and fertility.

Table 23: Cropland and Feed Availability, Bayantumen Soum and Dornod

Item	Unit	Bagh 4	Bayantumen Soum	Dornod
Soviet era cultivated	ha		11,000	
Soviet era irrigated	ha		11,000	
Current cultivated	ha	*2,100*		
Current irrigated	ha	-	-	
Current seeded	ha	*700*	4,000	*31,271*
Wheat	ha	-	2,000	
Oats for fodder	ha	*1,700*	2,000	
Yield, 2021				
Wheat	mt/ha	*1.1*	1.1	*1.1*
Oats for fodder	mt/ha	*1.6*	1.6	*1.6*
Total Production			**2022 est**	**2021**
Wheat	mt	-	2,220	34,711
Oats for fodder	mt	2,720	3,200	2,321

Source: NSO and local interviews

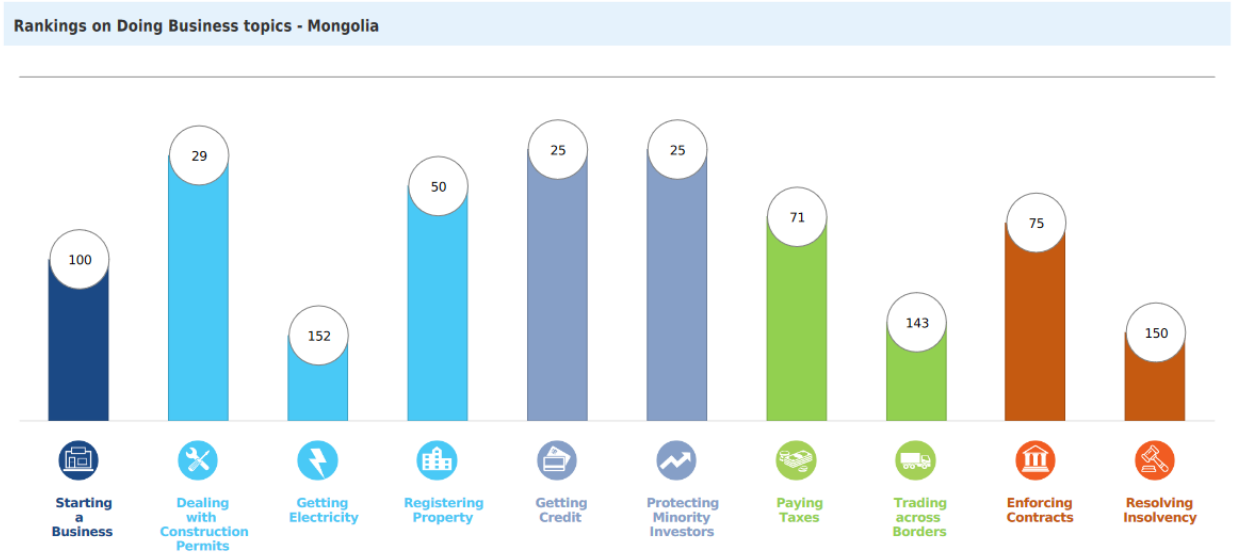
5 Business Models and Ownership Structure

5.1 Business Model Options

5.1.1 Doing Business in Mongolia

All businesses in Mongolia will face some common issues, regardless of the ownership and business model they select. The World Bank "Doing Business 2020" report assessed the difficulty of doing business in 190 countries, including Mongolia. Table 24 shows how Mongolia compares to other countries in the study. Major weaknesses exist in getting electricity, trading across borders, enforcing contracts and resolving insolvency. The study was conducted with businesses in Ulaanbaatar, so it could be expected that these challenges may be greater in rural areas, especially around the access to electricity.

Table 24: Difficulty of Doing Business in Mongolia. Rankings Out of 190 Countries



Source: https://www.doingbusiness.org/content/dam/doingBusiness/country/m/mongolia/MNG.pdf

The SME sector is a vibrant contributor to the economy and vital in remote areas lacking major employers. The main challenge faced by new start-ups is access to capital followed by governmental policies and taxes and related procedures[18].

5.1.2 Private ownership

Private ownership has become the standard model in Mongolia since transition to a market economy. The feasibility study in Deliverable 4.1 pointed the need for private ownership of the slaughterhouse if it is to be run efficiently, market competitively and maintain all food safety standards. There is a need to have a lead person who has the technical skills and experience to run a meat plant and has personal ownership in its success through investment of their own capital. As the meat market modernizes and becomes more

[18] https://www.ifc.org/wps/wcm/connect/fa1da257-f7a3-43a7-961f-720c19eb9e25/Women+SME-Mongolia-Final.pdf?MOD=AJPERES&CVID=kFmAtKt

competitive, it is likely that there will be more consolidation with larger companies' holder a larger market share. Their economies of scale will make it difficult for small enterprises to compete.

5.1.3 Cooperatives

It is difficult for individual producers with little volume and market power to increase the prices and values on their own. Cooperatives are a business model that allows small producers to gain greater scale, market share and power. Different structures of cooperatives are possible. In a closed cooperative, a new member must purchase membership rights. In an open cooperative, entry is free.

Agricultural cooperatives are still poorly developed in Mongolia. They tend to be family-based organizations and have often been formed to access project or government program benefits (financing and technical support) rather than being formed based on a long-term market incentive.

Regardless of the type, a cooperative must be competitive with private sector enterprises to survive. The success of a cooperative depends on several factors[19], including:

- Marketing management expertise.
- Value system coordination - the ability of the supply chain partners (distributors, processors, primary producers) to communicate and coordinate with each other.
- Scale – achieving sufficient volume to access markets and compete on price.
- Value-added traits – organic certification, connection to a geographic location, an attractive "story" about the product and/or producers can all gain the attention of consumers.
- Production system – a "push" system produces and then seeks the sales while a "pull" system produces when orders are received from the customer.
- Relationship with the end customer - the cooperative needs to have a good understanding of its customer base.

McCann and Montabon (2012) studied three beef cooperatives in the United States. Each took a different approach to marketing and production. Two were successful and one failed within five years. Table25, summarizes the case studies of the three cooperatives.

[19] *McCann, N., & Montabon, F. (2012). Strategies for accessing volume markets in the beef industry: A review of three cooperative business models. Journal of Agriculture, Food Systems, and Community Development, 2(2), 37–49. http://dx.doi.org/10.5304/jafscd.2012.022.014*

Table 25: Three Cooperative Case Studies (summarized from McCann and Montabon)

US Premium Beef Ltd	Tallgrass Prairie Producers Coop	Country Natural Beef
Membership included all stages of the cattle production. Each member had 1 vote, regardless of number of cattle. Knowing that a large slaughter and processing plant would not be viable, due to high fixed costs and investment, they partnered with a large slaughterhouse with excess capacity and took an equity share. Because of their participation in the processing business, they could communicate to their beef producer members about carcass quality problems and how to improve. This coop reached economic scale and demonstrated how smaller producers can partner with larger feedlot and slaughter systems to participate in and benefit from value chains.	The cooperative was formed to produce "sustainable" beef that conserved natural resources, protected animal welfare, used no chemicals and had low fossil fuel use. These concepts were new and needed professional management, critical mass of volume, cost-efficiency, and realistic pricing. It was essential to find a distributor or retailer that could buy enough volume. Because their cattle were grassfed, production was seasonal with no way to guarantee a steady supply of beef through the winter. The coop never developed sufficient volume or secured a processing plant or distributor. They also over-estimated what consumers would pay. The cooperative failed in five years.	The coop is based on the Japanese concept of mutually beneficial partnerships and relationships (*Shinrai*). Instead of owning processing plants or feedlots, the coop partners with companies who manage those processes. Feedlots are managed by cooperative members but are not owned by the cooperative. Slaughtering grew from 3,000 head of beef in 1990 to 47,000 head in 2009. Each member is required to visit retail establishments to build relationships with consumers and employees of retailers. This "pull" approach requires high levels of coordination with customers and processers and might not be profitable for coops without access to premium markets.

The following table shows how each of the cooperatives approached the success factors.

Table 26: Summary of Case Studies of Cooperative Business Models for Beef Marketing

Attribute	U.S. Premium Beef	Tallgrass Prairie Producers Co-op	Country Natural Beef
Marketing Management Expertise	Professional, full-time management	Not significant	Internal partners hire expertise as needed
Value System Coordination	Emphasis on communication between value chain stages	Poor due to seasonal production	Shared Risk and Rewards
Scale	Sufficient to secure processing capacity	Unable to maintain proper scale	Proper, in part due to pull production
Value-Added Traits	Lower priority	Primary attribute	Appropriate to what market will bear
Production System	Push system	Push system	Pull system
End-Customer Relationship	Not emphasized	Significant attribute	Customer visits required

Source: McCann and Montabon

Finding the appropriate scale of operation is important. If the coop has a small volume of sales, it cannot afford to hire a professional marketing manager. Yet, without professional marketing skills, a new coop would have a very hard time entering specialized or distant retail markets.

5.2 Business Models for Bayantumen Soum

Bayantumen soum has the physical resources to develop a new value chain approach for sheep and beef production and marketing. Identifying the right market segment and channel for Bayantumen livestock and products can provide an improved return to herders and provide the incentive for changes to production and marketing practices. However, the obstacles to be overcome are numerous. The business environment is challenging in Mongolia, especially for rural start-up enterprises. Agricultural cooperatives are legal and promoted in Mongolia, but few have managed to develop successfully. Access to commercial finance is difficult and rates are extremely high while soft loans for agriculture start-ups are limited. New technical skills and knowledge are needed and there are limited sources of information available. Finally, building a market for a branded product requires a level of marketing expertise that may not be available or affordable for the small-scale community plant.

For this reason, it is recommended to take a staged and layered approach that considers the current baseline of production standards and market opportunities and how to strategically meet a higher level of quality over time. Rather than trying to manage all nodes of the supply chain under one entity, the focus should be on building improved supply chain communication and coordination between them (Table 27).

Slaughterhouse: A small community scale plant targeted at the domestic market could be built on site or purchased as a mobile slaughterhouse. Given the investment, operating costs and relatively small scale, the plant would have to secure a soft investment loan and run at more than 80% capacity to earn a profit and repay its debt. It would need a manager with experience operating a slaughterhouse, managing food safety programs and marketing. This is a formidable task and, as recommended in Deliverable 4.1 and in the case studies in Section 5.1.3, most likely to be successful if left to a private sector investor with the appropriate skills, market connections and investment capital.

Developing a high-quality branded product sold for higher prices could offset the issue of scale for the plant. Branding takes time and, in the short to medium term, the plant would probably market locally to Choibalsan. There is an opportunity to market directly to Khaan Khuun, which has the capacity to absorb all the slaughterhouse production. As the plant builds a recognized brand, additional market channels could be added. Developing a quality-based brand would require a strong relationship with local herders to ensure that quality specifications and production practices were followed and verifiable. Clear contracting and pricing based on quality specification as well as improved breeding services, animal health services, access to finance and other strategies of mutual benefit.

Feedlots: Feedlots require a high level of investment and operating capital, technical knowledge in several areas of livestock production, marketing expertise and financial management. At this time in Mongolia, they are most likely to be established by companies that already have outlets for meat products and need to secure a steady supply of cattle. These companies may be large (i.e., MCS) or small (i.e., Xanadu Razorback) but seek to secure their supply chain by integrating the retail, slaughter, feedlot and feed production functions. In this case, the capacity of the feedlot would be driven by the capacity of the slaughter facility and its input needs.

Feedlots are not only a method of adding value to livestock. They are a method of adding value to crop production. Established farms, of any size, seeking to diversify their crop production, find better markets for lower quality grains, utilize crop residues, and keep workers engaged over the winter are also likely to establish feedlots. In this case, the capacity of the feedlot would be driven by the availability of feedstuffs produced on farm.

Primary Production and Backgrounding: Herders can immediately focus on improving the primary production of sheep and beef, where they already have experience and resources. A producers' cooperative could manage the joint marketing of feeder calves to feedlots, ensuring the feedlot uniform lots of cattle based on age and weight, thus improving the net price to herders, and decreasing transportation and marketing costs. Likewise, the coop could market standard lots of slaughter sheep (net 20kg carcass) directly to slaughterhouses. Prices could be pooled and split between members with a small portion of the revenues set aside for pasture and breed improvement activities. The coop could also be involved in the bulk purchase and transport of livestock feed to lower costs to members.

Table 27: Business Model Options

	Strategy	Ownership & Collaboration
End Market	**Short to Medium Term:** Develop high value markets as volume and relationships grow with buyers and herders. **Short Term:** Local markets. Sell direct to food processors on a contract basis.	Ownership: Private
Meat Plant	**Short to Medium:** Small facility for the domestic market to minimize costs. Target high value markets to make-up for lack of economy of scale.	Ownership: Private Contract with and/or own feedlot for direct connection with herders. Contract with herders for "Grassfed Beef / Sheep"
Feedlots	**Short to Medium:** Most feedlots run by integrated meat companies or crop farms with existing land, equipment. Crop rotations and manure improve soil fertility. Risk is diversified.	Ownership: Private. Collaborate with or own meat plant to secure sales and value added. Contract with herder coop to secure supply of calves.
Feeding on Pasture	**Medium Term:** Some herders with hay land and equipment begin to background cattle and sheep.	Private ownership of animals. Individuals sell directly to feedlots. If coop members are backgrounding, coop could handle sales.
Primary	**Short Term:** Restructure herds and begin selling young stock to existing feedlots and/or direct to slaughterhouses.	Private ownership of herds Coop to manage contracts, coordination and collect uniform animals. Link to Pasture User Groups (PUGs). Use a % of sales to for pasture and breed improvement.

5.3 Social Economic Impacts

The direct employment opportunities from the slaughterhouse and feedlot are quite small. The proposed slaughterhouse would provide up to 10 jobs. Roughly half of these would be in butchering has traditionally been done more often by men than women. Similarly, drivers are more commonly men. The positions of veterinarian, accountant and manager have higher participation by women. Another one or two jobs would be created at the feedlot feeding animals, cleaning pens, moving animals, and tending to animal health.

The larger and significant impact of the new value chain model will be at the herder household because of the increased revenues earned by selling younger stock. 52% of the soum families would benefit from sheep sales and 5% from cattle sales. The projected 66% increase in revenue from sheep and cattle sales would ease household vulnerability and lift some households out of poverty entirely. Women-headed households, migrant households and young families would benefit.

Caring for fewer animals through the winter would reduce the workload in the household, including for women. This would reduce their burden of unpaid work. Because animals would be better able to survive hard winters, households would also become more resilient against climate disasters.

5.3.1 Gender

The result of the Time Use Survey (2019) revealed that a rural man over 12 years old spends more than 1.5 time than a woman in production activities, but 3.9 times less in home chores and more time for self-development and private times (NSO, 2019). Rural women spend the most time on production activities, of which 71 percent of production activities are on household final products for consumption. Therefore, our research participants confirmed that "men are involved in agricultural production activities, and women are dominantly involved in milk and milk products processing and housechores". In addition, it proves that rural women have lack of opportunities to "earn" cash income from agricultural activities (Table 28).

Table 28: Gendered Division in Lck farming and House Chores

Activity	Man\Husband	Woman\Wife	Boy	Girl	No
1. Herding, watching and caring animals	83.3	10.8	5.9		
2. Search for animals	91.0	3.0	6.0		
3. Milking and preparing diaries	6.1	88.9			4.0
4. Haymaking and harvesting	74.0	3.0	4.0		19.0
5. Fencing pasture	44.9	3.4	1.1	1.1	49.4
6. Plant hay land or cropland	40.4	2.2	1.1		56.2
7. Housework (take care of child, clean houses, wash, cook and etc.)	7.1	84.7	2.0	6.1	
8. Meet with officials for business	70.7	24.2	2.0		3.0
9. Participating in herders' group's activities such as meetings, trainings etc.	68.7	26.3	1.0		4.0
10. Treating animals, preventing diseases, washing and tec.	74.2	19.6	5.2	1.0	

Source: Herders' survey in Bayantumen soum, Dornod, June, 2022

The relatively low participation of female herders in the agricultural production activities is related to the fact that the herder families are live separately in the soum center and countryside during the school year. In Bayantumen soum, 185 families live separately in the soum or aimag center during schooling, including 28 families from the target bagh who live separately in the soum center (Table 29). This separate living has reduced women's participation in the livestock production as well as their income and power (or authority) in the family. In addition, when the woman is absent and only one family member is producing the household products, it limits both production and income, increases human resource constraints, and increases household expenses as well, if these products must be purchased.

Table 29: Number of herder households that separate in soum center during schooling

	1st bagh	2nd bagh	3rd bagh	4th bagh	Total (soum)
Separated households because of schooling	66	50	41	28	185

Source: *Social worker's registration sheet of Bayantumen soum, 2022*

If the suggested slaughterhouse and feedlot will provide job places for women, it will contribute to increasing the women's participation rate in the labor force at the soum level. Women who live separately in soum center and have few livestock could be hired by the new slaughterhouse for plant operations (clean intestines, skin and process animal skins, meat cutting, other) or as veterinarian, driver, accountant and manager. The beef feedlot positions of feeding animals, cleaning pens, moving animals and tending to animal health have higher participation by women.

Increasing the number of young animals sold in the fall will result in caring for fewer animals through the winter. This will reduce the workload in the household, including for women. This would reduce women's burden of unpaid work. Because animals would be better able to survive hard winters, households would also become more resilient against climate disasters.

Statistical information on Bayantumen soum and 4th bagh female herders show they have very limited opportunities to share interest and present voice in decision making processes and that they lack the possibility to benefit equally from the public policies and measures (Table 30). To ensure gender equality in sustainable livestock herding and slaughtering, it is necessary to create a structure that can effectively ensure women's real participation:

1. Create a sub-council of women within herders' groups or cooperatives.
2. Organize trainings with aims to develop members' life skills and leadership of the sub-councils.
3. Update herder groups and cooperatives bylaws to integrate sub-councils' voice.
4. Integrate participatory monitoring and evaluation into herder group or cooperative management.

Table 30: Men and Women's Participation at the Decision-making Level of the Target Soum and Bagh

Organization	Man	Woman	Total
Chairman of soum's Citizens' Representative Khural (CRK)	1		1
Representative of soum's CRK	16	5	21
Herder representative of soum's CRK	3 (1 is from 4th bagh)	1 (with higher education certificate)	4

Organization	Man	Woman	Total
Soum governor		1	1
Council of soum governor	5	8	13
4th bagh governor	1	1	
Bagh's citizens' council	5	2	7
	Rich herder	Middle	Lower
Herder representative of soum's CRK	2	1	1

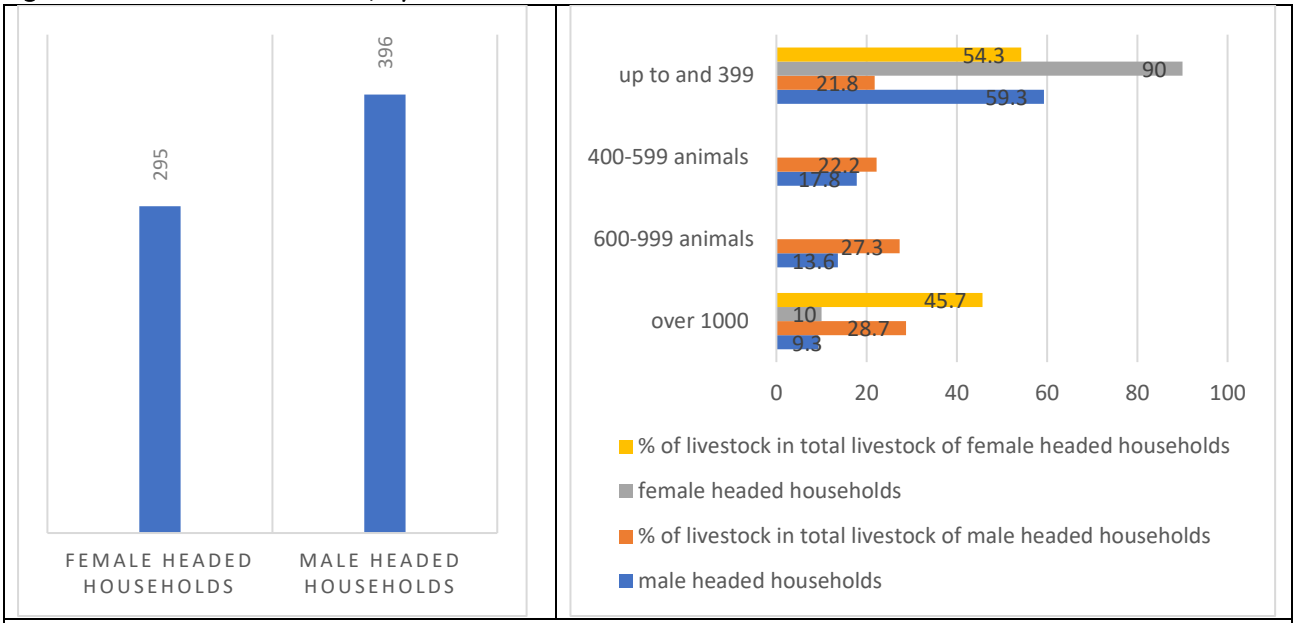
5.3.2 Vulnerable households

In the 4th bagh of Bayantumen soum, livestock ownership is highly concentrated with about 10 percent of herder households owning 28.7 percent (about one in three) of the livestock while 61.7 percent of herders own 399 or fewer animals and 70.9 percent of have 200 or fewer animals. This indicates that most herders are poor and at risk of poverty because they are extremely vulnerable to unexpected natural disaster and pastural degradation. The average herd size of female headed households was 100 head smaller than for male headed households. In the highest size category (more than 1,000 animals), male and female households were equally represented at 10 percent. These female-headed households own nearly half (45.7 percent) of the total number of animals herded by female-headed households Women are over-represented in the small herd size categories; 90 percent of the female headed households but only 59 percent of the male headed households own 399 or fewer animals (difference of 31 percent) (Figure 12). During the study, the majority of herders expressed that they will increase the size of their herds to increase their livelihood.

It was observed that households with few animals will herd the animals of the wealthy households from other aimags and regions. As a result, the average number of animals per household, calculated from the Vulnerability Study was higher by 100 animals than the average calculated in the official census. This data may alternatively present that extra animals which are not registered in the official census or registration of the target bagh or soum.

Disparities in herd size among the target population relate to an authority or power gap between rich and poor herders observed at the target bagh (Table 30). Insufficient participation and representation at the local decision-making level is observed among the herders, especially herders with small herds. Herders with many animals are mostly chosen as a head or leader of a herders' group or cooperatives.

Figure 12: Number of Livestock, by Sexes of Household's Head



Source: livestock census information of 4th bagh, Bayantumen soum, 2021

If a local slaughterhouse and feedlot can be socially inclusive and promote community participation, it could replace the strategy of increasing livestock numbers to improve economic well-being of the herders with few livestock. As calculated earlier, the direct employment opportunities from the slaughterhouse and feedlot are quite small. The proposed slaughterhouse would provide up to 10 jobs. Almost of the job positions can be filled by local men and women from vulnerable households if they are trained on the job. Strict adherence to the Labor law and other regulations of Mongolia at the suggested slaughterhouse and feedlot will protect employees' and employers' labor rights while ensuring that neither is subject to unfair treatment or exploitation.

The larger and significant impact of the new value chain model will be at the herder household because of the increased revenues earned by selling younger stock. 52 percent of the soum families would benefit from sheep sales and 5% from cattle sales. The projected 66 percent increase in revenue from sheep and cattle sales would ease household vulnerability and lift some households out of poverty entirely.

58 percent of herders with less than 300 head have winter camp and 54.5 percent have received their certificate. 28.6 percent of them have fall camp (Table 31). It is difficult for herders with a few animals to have their own winter camp and certificate. They may also face a shortage of pasture due to the in-migration of families and animals from other provinces and large herders who buy a land. Therefore, local governing bodies should pay special attention to providing official certificates to own and use of winter, spring camp and hay land for the vulnerable households that could not exercise their land right. Some soums have implemented a land ownership program titled "Winter camp for every herder household".

Table 31: Ownership of Camps by Number of Livestock Herding (%)

Camps\number of livestock	0-300	301-500	501-999	1000 and over 1000
Winter camp	58.3%	80.0%	86.4%	95.0%
Spring camp	28.6%	50.0%	76.2%	94.4%
Summer camp	34.5%	60.0%	70.8%	87.5%
Fall camp	27.6%	61.5%	47.6%	100.0%

5.3.3 Migrants

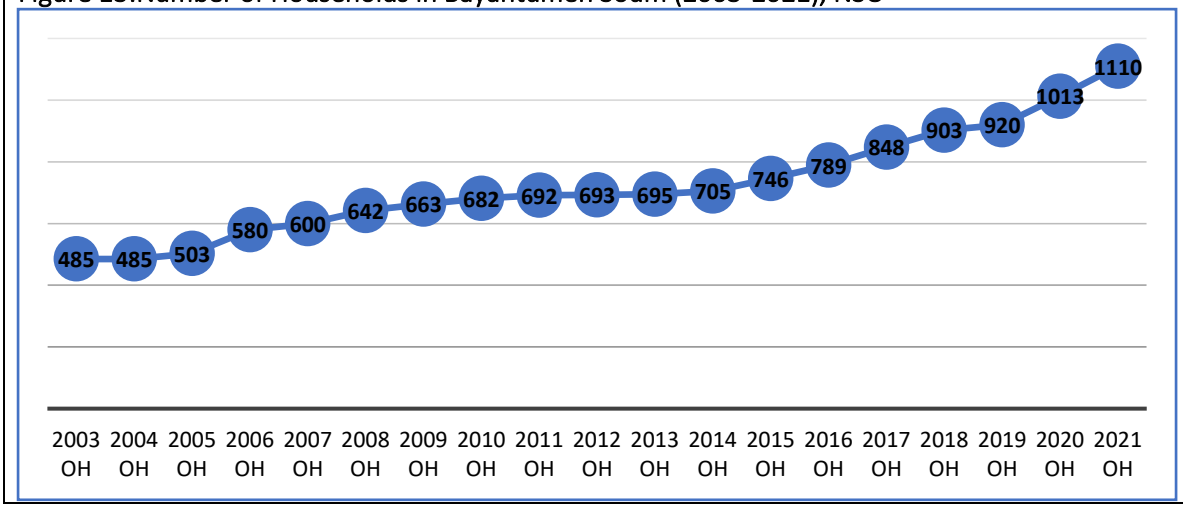
According to the NSO (2021), the number of households in Bayantumen soum, especially number of rural households, has been increased by 2.3 times since 2003 (Figure 13). Between 2018-2022 totally 212 households migrate to this soum. The increase of the number of households was caused by the migration to this soum and birth rate as well as separation of households into every younger member because of interest to own a separate land to use as a winter camp. As a soum's citizens registration information, almost twice as many people migrated to Bayantumen soum in 2022 compared to 2018. In 2022 60 percent of the migrants are men (Table 32).

Table 32: Information on Migration to the Target Soum (2018-2022)

Migration to the target soum	2018			2019			2020			2021			2022		
	M	F	Total	M	F	Total	M	F	Total	M	F	Total	M	F	Total
Migrated population	36	23	59	27	21	48	57	23	80	62	24	86	67	45	112
Migrated households	47			45			39			45			36		

Source: Soum's citizens' registration staff's information, 2022 NOTE: M-male; F-female

Figure 13:Number of Households in Bayantumen Soum (2003-2021), NSO



The following issues have been raised because of migration in this soum:

1. Migration of wealthy herders has contributed to increased degradation of pasture.
2. Wealthy households can buy winter camps or obtain land permits from local government. It leads to vulnerable herders - who do not own their land – being at risk of losing their pastures and land for the building of new winter camps for wealthy households.
3. Migrants with few livestock complete with the local herders to use public pasture, gaining access though informal leasing negotiations with the local herders. These migrants face social discrimination and economic pressure.
4. Male dominated migration to this soum is distorting the gender proportion of the local herders.

The recommended pasture and herd management and new value chain model will create benefits for both local and migrant herders as they will decrease of number of livestock. In addition to this, if the new value chain model will be learned in different soums and aimags as a best practice the migration to this soum will be decreased in future.

5.3.4 Youth

Children of the herders, usually girls, tend to prefer higher level education and to live at urban area. All educational programs from preschool to upper secondary education do not consider the preparation of herders. Rather, they are mainly focused on leaving the animal husbandry lifestyle. To this point, in Bayantumen soum there are no students currently majoring in the field of animal husbandry at the Mongolian University of Life Sciences. If the labor of animal husbandry can be reduced and profits increased, a younger generation of herders will be attracted to the sector. The suggested new value chain model will contribute to this prospect. Herding and pasture management revision will also influence on next generation's career choice.

Table 33: Number of Herders, aged 15-35 (m/f) Bayantumen Soum, 2022

Bagh's name	Total	Male Herders	Female Herders
1st bagh	282	157	125
2nd bagh	274	166	108
3rd bagh	188	108	80
4th bagh	120	75	45
Total in soum	864	506	358

5.4 Financing Options

Access to adequate amounts of investment and operating capital at affordable rates will be critical to the success of the project. Commercial interest rates are high in Mongolia. Several different programs offer soft rates, including:

- IFC Meat Program for meat plants and feedlots
- WB Livestock Commercialization Project. The next phase of this project will support meat plant and feedlot clusters.

- Small and Medium Enterprise Support Fund provides 3 percent interest to agricultural investments.
- ADB Agricultural and Rural Development Loans via TDB and Golomt Bank. This program provides loans of 2-8 billion MNT for up to seven years at an interest rate of 8 percent.
- "Herder" operating loans (18 percent) repaid twice per year. These loans are provided through:
    - Khan Bank: up to MNT 20 million for 24 months at 19.2 to 21.6 percent.
    - State Bank: up to MNT 30 million for 24 months at 18 to 21.6 percent.

The GCF has three programs in Mongolia. The Improving Adaptive Capacity and Risk Management of Rural Communities in Mongolia project (implemented by the UNDP) provides climate information and planning, and support to resource management and market access. This project is exploring an Impact Investment Fund that could provide a pool of up to $20 million over 10-years to support sustainability in livestock and climate-resilient livestock products. The GCF MSME Business Loan Program for GHG Emission Reduction (XacBank) supports investments into green energy and building improvements for energy efficiency.

The largest GCF project has not begun implementation. The Aimags and Soums Green Regional Develop. Investment Program (ASDIP) has an overall value of more than USD 700 million. It was approved by GCF 19 Mar 2021 but is pending ADB and local approvals. Its focus is to limit the number of animals and strengthen agribusiness value chains, like what is proposed for Bayantumen soum. The project would create the Partnership for Low-Carbon and Climate-Resilient Rangeland Management in Asia fund catalyze investments. Funding programs would include climate finance and private sector investment, grants, agribusiness loans, micro-finance, and Payments for Environmental Services (PES). The project would begin in Bayan-Ulgii, Khovd, and Uvs over the first three years and then expand across the county.

PES is a supplementary funding steam that can support biodiversity protection and restoration by providing carbon offsets payments for carbon sequestered by improved pasture management. The Mongolian Nomad Project is implemented by the Mongolian Society for Rangeland Management (MSRM) and the University of Leicester. Payments are managed through the Plan Vivo platform and standards. Payments to herders are based on management changes that increase soil carbon. The program is helping to restore the traditional nomadic way of life to reduce over grazing pressure on sensitive ecosystems. Individuals and business can "buy" carbon offsets online at https://www.clevel.co.uk/mongolian-nomad-project/. The project protects four key grassland habitats including riparian meadow, mountain meadow, mountain steppe and steppe and four key species including ibex, saxaul trees, marmot and Mongolian gazelle. This program is not yet available in Dornod.

5.5 Supporting Actions Required

Developing a new value-chain approach will require support from Government, researchers, extension programs, projects, banks and the private sector. Some of the following recommended activities are already supported by the National and *Aimag* Government through implementing relevant national programmes and other initiatives supported by donors and private sectors.

- Pasture Management

1. Provide training and technical support for pasture management and monitoring emphasizing the importance of carrying capacity, stocking rates, timing and length of grazing, percentage of forage consumed and period of rest.

- Herd Management and Marketing
  2. Encourage herders to improve meat sales by culling less productive animals and provide information on which basis herders should make decisions about holding or selling the livestock.
  3. Focus on improving breeds while taking natural and climatic features and strengths of soum, feed production base and consumer needs into consideration.
  4. Provide training and technical support on animal nutrition, livestock feeds and feeding programs.

- Animal Health
  5. Provide the quality and accessibility of veterinary services and pay business entities that work in the field based on the resolution of soum and bagh Citizens' Representatives' Khurals.
  6. Initiate regular community awareness, advocacy and information exchange programs to educate herders on the importance of obtaining mandatory animal health services. Themes would cover how to avoid misuse of veterinarian drugs, the benefits of obtaining veterinarians services for diagnostics to help prevent disease from spreading within the herd, and how to organize preventative measures such as deworming and vaccination.

- Processing and Trade of Livestock and Livestock Products
  7. Support local businesses and cooperatives willing to establish slaughterhouses, further processing and by-product processing and facilitate access to finance through banks, government and donors.
  8. Promote standardized meat cuts and grading with price differentiation.
  9. Arrange low-interest lending for investments in new technology, equipment and facilities upgrades and improved logistics (e.g., refrigerated trucks, storage) for businesses and cooperatives.
  10. Improve and monitor the control of professional organizations in hygiene, sanitation and safety of meat that is sold in central areas such as Ulaanbaatar, Darkhan, Erdenet and aimag centres.
  11. Facilitate networking, information exchange and training from state and professional non-governmental organizations for meat producers.

- Business and Cooperative Management and Development
  12. Organize training on entrepreneurial skills for herders, cooperatives, and small businesses.
  13. Educate herder cooperatives with relevant existing policy, programs and training to help them improve the cooperative management and governance.
  14. Facilitate access to soft loans with longer repayment terms for enterprise start-up, improvements and operating.

- Coordination Between Value Chain Actors
  15. Establish and implement cooperation means between herders and cooperatives and provide information and training to understand what market they should target and the related market requirements and specifications.
  16. Coordinate herder cooperatives to have direct linkages with domestic meat processors.

17. Develop a bargain and credit system for effective cooperation with herders.

- Consumer Awareness

18. Carry-out consumer awareness and public education programs on food safety and nutrition, taking care to address misinformation currently in the public domain.

Annex A. Beef Cow Productivity

With a focus on farming for profit through quality rather than quantity, the cow becomes the profit center. Physical and economic performance can be measured relative to the cows over-wintered.

Table 2. Economic Performance Indicators ($/Cow Wintered)

			2016	2017	2018	2019	2020	Average of Years
		Average Farm Size (wintered cows)	167	161	214	211	182	188
					$/Cow Wintered			
(A)	1.	Weaned Calves	977.86	1,057.17	1,016.57	1,083.54	1,049.14	1,038.78
	2	Cull Cows/Open Heifers	204.95	163.60	176.44	192.25	194.77	185.60
	3.	Bulls	29.12	37.79	22.53	33.05	23.91	28.79
	4.	Bred Cows/Bred Heifers	57.93	71.20	52.48	64.15	64.41	61.44
	5.	Miscellaneous Receipts	24.63	6.44	21.59	10.52	1.31	13.09
	6.	Government Programs	11.23	21.11	3.30	3.67	3.78	7.79
	7.	Inventory Adjustment	-83.55	182.95	159.35	81.38	185.44	113.87
	8.	Less: Cattle Purchases	420.09	334.25	393.60	284.50	452.94	374.54
		Value of Production	**802.08**	**1,206.01**	**1,058.47**	**1,184.06**	**1,069.82**	**1,074.81**
(B)	1.	Winter Feed	390.01	373.02	342.43	413.53	375.24	377.10
	2.	Bedding	19.00	25.31	12.42	17.79	17.78	17.89
	3.	Pasture	240.99	270.45	287.78	316.02	300.91	286.36
	4.	Veterinary & Medicine	30.55	39.74	32.01	36.39	32.85	34.26
	5.	Breeding Fees/Bull Rental	0.10	1.50	2.53	3.25	6.85	2.96
	6.	Trucking & Marketing Charges	17.04	16.61	17.33	12.32	20.31	16.62
	7.	Fuel	20.34	19.59	24.58	20.76	14.60	20.31
	8.	Repairs - Machine	23.07	22.62	15.44	18.28	16.56	18.70
	9.	Repairs - Corrals & Buildings	10.74	24.53	14.48	11.21	12.38	14.53
	10.	Utilities & Miscellaneous Expenses	38.52	32.88	31.25	40.71	27.31	33.99
	11.	Custom Work & Specialized Labour	2.62	4.63	8.14	6.09	7.06	6.02
	12.	Operating Interest Paid	3.10	3.23	9.97	9.64	2.30	6.20
	13.	Paid Labour & Benefits	22.20	20.20	17.02	18.86	23.95	20.10
	14.	Unpaid Labour	51.31	62.01	59.64	67.05	55.48	59.62
		Variable Costs	**869.58**	**916.34**	**875.01**	**991.91**	**913.59**	**914.67**
(C)	1.	Share/Lease Cattle Payments	0.04	4.59	2.58	4.42	0.00	2.46
	2.	Taxes, Water Rates, Lic. & Insurance	12.42	17.60	16.64	11.23	12.56	14.18
	3.	a) Equipment & Building Depreciation	67.23	61.18	60.04	56.74	56.22	59.88
		b) Lease Payments	6.90	1.48	0.65	5.28	3.01	3.23
	4.	Paid Capital Interest	5.43	5.77	21.45	6.69	8.47	10.51
		Total Capital Costs	**92.01**	**90.63**	**101.36**	**84.36**	**80.26**	**90.25**
(D)		**Cash Costs (B+C-B14-C3a)**	**843.05**	**883.77**	**856.69**	**952.48**	**882.15**	**885.42**
(E)		**Total Production Costs (B+C)**	**961.58**	**1,006.97**	**976.37**	**1,076.27**	**993.85**	**1,004.93**
(F)		**Gross Margin (A-D)**	**-40.96**	**322.24**	**201.78**	**231.58**	**187.67**	**189.39**
		Return to Unpaid Labour (A-E+B14)	**-108.19**	**261.06**	**141.74**	**174.84**	**131.45**	**129.51**
		Return to Investment (A-E+C4)	**-154.08**	**204.81**	**103.55**	**114.47**	**84.43**	**80.39**
		Net Return (A-E)	**-159.50**	**199.04**	**82.10**	**107.79**	**75.96**	**69.89**

Source: AAFRD, AgriPofit$, 2016-202 Economic, productive and financial performance of Alberta cow/calf operators

Annex B. Feedlot Location Checklist

Site:

Location:

Business Function	Questions to Ask	Score (0, 1-5)	
		Current	Potential

Human resources	• Why do you want to establish a feedlot? What are your objectives, and do family members and employees agree?
	• Are you committed to feeding cattle long enough to justify the investment?
	• Have you developed a management team that includes experts and consultants in animal nutrition, animal health, marketing, engineering, financing? Have you discussed your plan with them?
	• Do you have, or can you hire, the labor to feed and take care of the cattle?
	• Do you have, or can you learn or can you hire, the skills or expertise to successfully feed cattle, including:
	  • Purchasing cattle
	  • Marketing of the fed cattle
	  • Risk management for cattle and feed inputs
	  • Cattle management (reading bunks, walking pens, sorting cattle, veterinary treatment of cattle)
	Technology for record keeping (computers, etc.).		

Farm resources	When looking at the feedlot in the context of the whole farm system, are there synergies that can be captured by adding a feedlot, or is it a stand-alone enterprise? Can you grow most of the feed you will need for the feedlot? What are the local feed opportunities? What can be purchased locally? Do you have land near the feedlot for applying the manure from the feedlot? Can existing machinery and buildings/facilities be used more efficiently? Will additional equipment and infrastructure need to be purchased? Do you have enough equity and loan borrowing capacity to add the feedlot, cattle and feed without putting existing farm business or other assets at risk? Do you have a long-range budget, cash-flow budget, and loan repayment plan? How long is the period of loan		

Annex B: Feedlot Location Checklist

Business Function	Questions to Ask	Score (0, 1-5)	
		Current	Potential
	repayment? What kind of return on your investment do you anticipate? Is this realistic?		
Site selection	Is the feedlot site easily accessible for trucks hauling livestock and feeds (for example, the condition of the road year-round)? Does the site for the feedlot have sufficient separation distance to other peoples' homes to avoid nuisance form dust, smells flies and noise? Does the site for the feedlot already have, or can it economically obtain, sufficient: Electrical supply? Water supply? Wind protection for winter conditions? Exposure to cool summer winds? Does the site for the feedlot have south-facing exposure for winter feeding? Slopes of 2-8 percent to provide good feedlot pen drainage? Does the site for the feedlot have the possibility to grow in the future if you plan to expand the size of it?		
Zoning and permits	Is the location in a site approved within local land use and development regulations?		