

СЕКЦІЯ VIII. АГРАРНІ НАУКИ ТА ПРОДОВОЛЬСТВО

TECHNOLOGICAL FEATURES OF BEEF PRODUCTION FROM ABERDEEN-ANGUS CATTLE IN THE UKRAINIAN STEPPE ZONE

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Introduction. Providing the population with high-quality food products, particularly beef, is one of the priority tasks for Ukraine's agro-industrial complex within the framework of European integration and the necessity to strengthen the state's food security [8, 12, 13]. In the current market environment, the traditional method of obtaining beef as a by-product of dairy farming is no longer capable of satisfying increasing consumer demands regarding the biological value, culinary characteristics, and marbling of meat [1, 2, 5]. This necessitates an urgent transformation of the industry, taking into account technological conditions and production capacities [6, 8], and a transition to specialized beef cattle farming, where the Aberdeen-Angus breed remains the global leader in terms of productivity and product quality.

Aberdeen-Angus cattle are distinguished by their unique adaptability, high growth energy across different age periods, and genetically determined meat palatability. Due to their compact physique, polled status, and ability for intensive intramuscular fat accumulation, this breed is an ideal subject for

creating high-profit beef herds. However, the efficiency of realizing the genetic potential of Angus cattle significantly correlates with the technological solutions applied in specific natural and climatic zones, as a discrepancy between feeding conditions and the biological requirements of the animals can lead to decreased growth rates and poor feed conversion [3, 4, 9].

The Steppe zone of Ukraine, specifically the Dnipropetrovsk region, is characterized by a specific combination of significant pasture potential with risks of prolonged summer droughts and the necessity for extended stall feeding during the winter period. Such a climatic gradient requires the development and implementation of adaptive seasonal fattening technologies that would allow for the maximum use of natural, low-cost vegetative mass in summer while ensuring stable gains through balanced rations in winter [7, 11, 14]. The relevance of this topic is further reinforced by the need to find an optimal balance between pasture-based and concentrate-based feeding types to achieve target slaughter indicators.

Researching the technological features of beef production based on dynamically developing farm enterprises, such as the Farm Enterprise "Maksym B," allows for a comprehensive assessment of the viability of intensive beef cattle rearing models in Steppe conditions. Studying the practical experience of applying differentiated rations and management methods makes it possible to find ways to significantly reduce production costs through the rational use of internal feed resources and the optimization of technological processes [7, 8, 10]. Thus, the scientific substantiation of seasonal fattening cycles is key to increasing the competitiveness of domestic beef cattle farming in both domestic and international markets.

Aim. The aim of the research is to analyze the technological cycles of rearing and fattening Aberdeen-Angus cattle under the conditions of the "Maksym B" farm enterprise in the Kamianske district, to study the influence of seasonal factors on animal productivity indicators, and to substantiate the economic efficiency of beef production using this technology.

Materials and methods. The experimental part of the research was conducted at the "Maksym B" farm enterprise (Kamianske district, Dnipropetrovsk region).

The object of the study was the production process of rearing and fattening Aberdeen-Angus beef cattle. To conduct the research using the analog-group principle, representative groups of animals were formed, taking into account their age, live weight, and physiological state. The study covered the main herd (cows), suckling calves, and animals under intensive fattening.

Generally accepted methods of zootechnical control were applied during the work. The dynamics of live weight were determined by individual weighing of the animals at the beginning and end of each technological period (season) with an accuracy of 0.5 kg. Average daily gains (ADG) were calculated according to the standard formula as the ratio of absolute weight gain to the number of days between weighings. Rations were evaluated by comparing actual feed consumption with detailed feeding standards based on key indicators (feed units, dry matter, metabolizable energy, crude protein, mineral elements, and vitamins). Slaughter indicators were assessed based on the results of control slaughters and analysis of the farm's primary data (slaughter weight, slaughter yield, and body condition category).

Economic indicators were calculated based on the farm's production costs. The cost per quintal (100 kg) of live weight gain, the profitability of the beef cattle industry, and feed conversion (feed units consumed per unit of gain) were determined.

The obtained numerical data were processed using methods of variational statistics with Microsoft Excel software.

Meteorological conditions of the region (temperature regime and precipitation) were also taken into account to analyze the duration of the pasture period and the productivity of the lands in the Kamianske district.

Results and discussion. Analysis of the technological cycle at the "Maksym B" farm enterprise showed that the farm utilizes a classic beef cattle production model adapted to the conditions of the Steppe zone. The herd is based on Aberdeen-Angus cattle, which, due to their genetically determined polled status and compact physique, are highly technological for both pasture-based and stall-feeding systems.

At the enterprise, the rearing and fattening of beef cattle is a complex multi-stage process involving a system of zootechnical, organizational, and veterinary-sanitary measures aimed at obtaining high live weight gains, forming high-quality meat products, and ensuring the economic efficiency of production. Unlike dairy farming, beef cattle farming is focused not on milk production, but on the intensive growth and development of muscle tissue, optimal feed conversion, and high slaughter yield [9-11].

A distinctive feature of beef cattle is their ability to effectively utilize bulky feeds and pastures, which allows for reduced feeding costs and makes beef production more economically viable. The rearing of young stock, from birth to sale for meat, is divided into several interconnected stages, each with its own

technological characteristics and requirements. The dynamics of growth intensity and changes in rations depending on the season are clearly presented in Fig. 1.

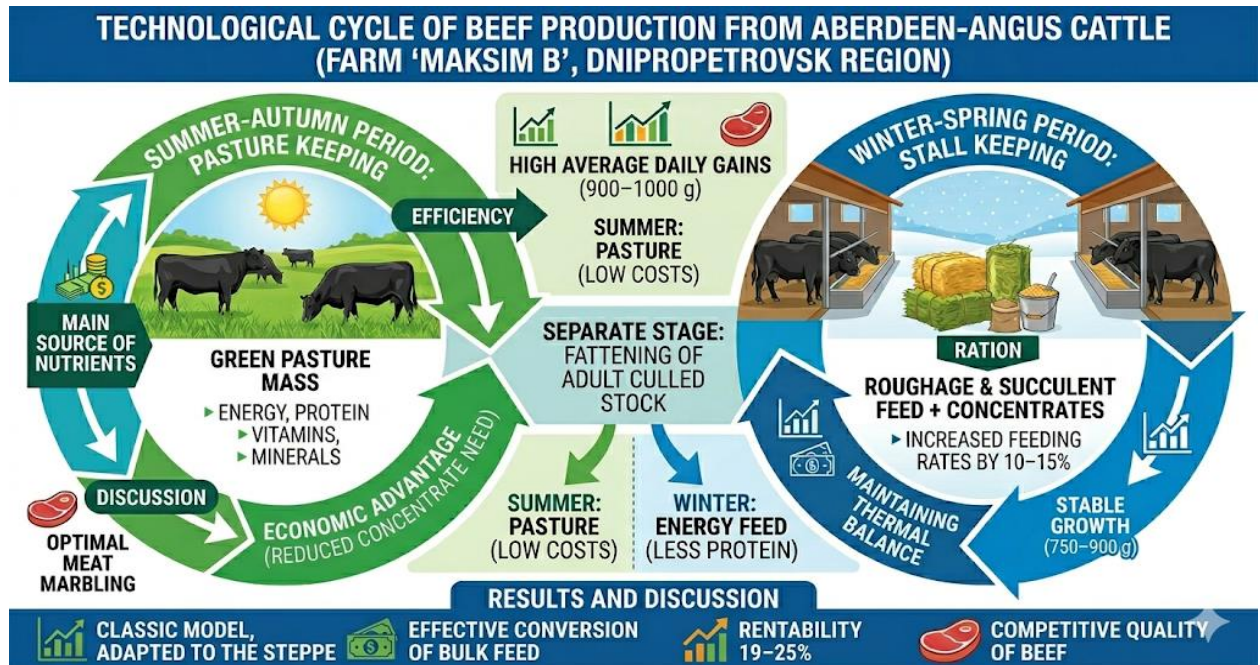


Fig. 1. Dynamics of growth intensity and changes in rations depending on the season

The Aberdeen-Angus breed is one of the most adaptable to various natural and climatic zones of Ukraine, particularly the steppe zone of the Dnipropetrovsk region. At the farm, the fattening technology for beef cattle is based on the rational use of pastures during the warm period of the year and balanced stall rations during the winter period. This approach allows for maintaining a stable level of herd productivity and obtaining high-quality beef throughout the year.

The climatic conditions of the Kamianske district are characterized by warm summers, moderately cold winters, and a sufficient number of sunny days, creating favorable conditions for pasture-based cattle management. Therefore, the seasonal factor plays a crucial role in ration formulation, average daily gain levels, and the final indicators of meat productivity.

The season of animal management has a significant impact on the efficiency of fattening. In the summer period, the main source of nutrients is the green mass of pastures, which provides animals with energy, protein, vitamins, and minerals. Pasture fattening is economically advantageous as it

reduces the need for concentrated feeds and the costs of feed harvesting. In the winter period, fattening is based on the use of roughage and succulent feeds in combination with concentrates. During this time, the energy needs of the animals increase due to the maintenance of thermal balance; therefore, rations must be more nutritious. Feeding standards are typically increased by 10–15% compared to the summer period.

A special place in the farm's beef production system is occupied by the fattening of culled adult cattle. The goal of this stage is to increase live weight and bring the animals to optimal fatness before sale. In adult animals, weight gain occurs primarily due to fat deposition; therefore, the need for protein is lower than in young stock. Rations for culled cows and bulls are formulated with an emphasis on the energy value of feeds, utilizing roughage and succulent feeds with a moderate amount of concentrates. In the summer period, it is advisable to use pasture fattening, which significantly reduces feed costs and ensures acceptable meat quality.

The efficiency of rearing and fattening technology for beef cattle is determined by the level of average daily gains, feed conversion, herd survival rate, and the quality of the resulting beef. The rational combination of pasture management, balanced feeding, and a differentiated approach to different age groups of animals allows for the achievement of high production indicators at optimal costs.

The productive qualities of Aberdeen-Angus cattle largely depend on seasonal housing and feeding conditions, which directly affect growth intensity, fat deposition levels, slaughter indicators, and the final quality of meat products [4, 5].

In the studied farm, seasonal fluctuations in productivity are caused by dynamic changes in the feed base, levels of animal physical activity, temperature fluctuations, and changes in cattle management methods throughout the year. The highest indicators of average daily live weight gain are observed in the summer period. This is explained by the effective use of natural pastures, which provide animals with complete green feeds high in digestible protein, vitamins, and minerals. Furthermore, grazing promotes active motion in animals, improving appetite and intensifying metabolism, which positively affects the growth rate of young stock and the formation of muscle tissue.

Under such conditions, the average daily gains of Aberdeen-Angus cattle on the farm reach 900–1000 g, and the live weight at sale is 520–600 kg. The

slaughter yield in the summer period is at a high level — 58–60%, indicating the outstanding meat productivity of the breed. Economic indicators and slaughter yield are reflected in the structure of the technological cycle (Fig. 2).

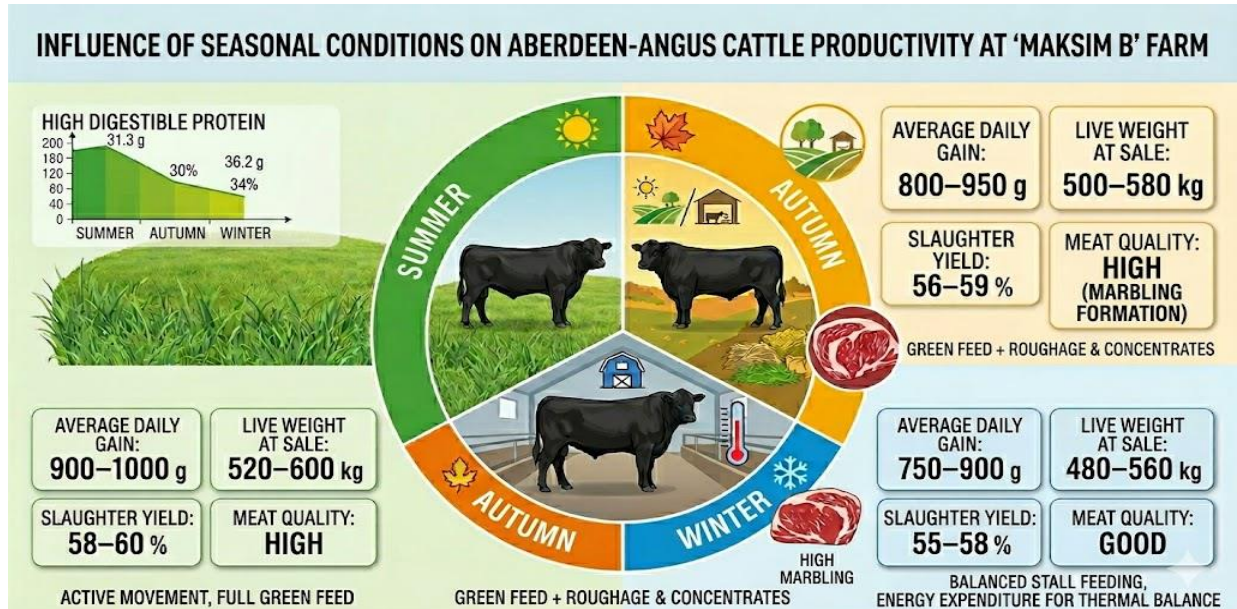


Fig. 2. Efficiency of beef production in the farm enterprise

The autumn fattening period serves as a transition stage between pasture-based and stall-based management; however, it is also characterized by consistently high productivity indicators. During this time, animals continue to consume remaining green forage, while rations are further enriched with roughage and concentrated feeds of the farm's own production. This feeding system promotes the accumulation of the body's energy reserves and intensive intramuscular fat deposition. Average daily gains during the autumn period range from 800–950 g, with a slaughter yield of 56–59%. It is during the summer-autumn period that meat with high marbling and a tender texture is formed, which is the key consumer value of this breed.

In the winter period, cattle productivity decreases slightly, which is attributed to the transition to stall housing, limited physical activity, and the absence of succulent green forage in the rations. Additionally, a portion of the ration's energy is expended on maintaining thermoregulation under low-temperature conditions. However, thanks to complete and balanced feeding, as well as the normalization of rations based on dry matter and metabolizable energy, the "Maksym B" farm enterprise ensures stable growth. During this period, average daily gains amount to 750–900 g, and the slaughter yield is 55–58%. The meat quality is rated as good, with a sufficient level of fat deposition.

Calculations showed that the combination of low-cost pasture management with intensive final fattening provides the farm with a profitability level of 19–24%. The primary source of savings is a significant reduction in expenditures on expensive concentrated feeds during the summer period. This proves that, provided strict adherence to technological discipline, beef cattle farming based on the Aberdeen-Angus breed is a financially stable and promising industry even for medium-sized farm enterprises in the Dnipropetrovsk region.

Thus, the seasonal fattening technology at the "Maksym B" farm enterprise is effective and economically expedient. The rational use of pastures, timely adjustment of rations, and full-fledged stall feeding allow for the production of high-quality beef throughout the year, meeting the modern requirements of intensive beef cattle farming.

Conclusions. The research conducted at the "Maksym B" farm enterprise confirms the high adaptability of Aberdeen-Angus cattle to the conditions of the Northern Steppe. The farm's technological model ensures a rational combination of pasture resources and stall-based fattening.

The herd's productivity fully complies with high breed standards. The average live weight of cows is 550–600 kg, and that of calves at weaning is 200–230 kg. When animals are sold for meat at the age of 18–24 months, the average live weight reaches 500–600 kg. Given a slaughter yield of 55–60% and a meat yield from the carcass of 57–59%, this ensures high production intensity.

Feeding technology is based on the use of balanced rations calculated according to the physiological state of the animals. Providing dry cows at a level of 1.4–1.6 feed units per 100 kg of live weight, and nursing cows at 9–10 feed units in the first half of lactation and 7.9–9.2 feed units in the second half, promotes the maintenance of high body condition, stable reproduction, and quality fattening of young stock.

It has been established that the seasonal combination of pasture housing in summer and balanced stall feeding in winter is a key factor in effective feed conversion. This allows for the mitigation of seasonal risks, the maintenance of stable average daily gains at the level of 850–1000 g, and the production of high-quality beef with high marbling.

The economic efficiency of beef cattle farming on the farm is driven by the high feed efficiency of Aberdeen-Angus cattle. Competent cost planning and the sale of high-quality products allow for maintaining industry profitability at the

level of 19–24%, proving the viability of this model in modern market conditions.

Proposals for production. It is recommended to improve the fattening system through more precise ration formulation, taking into account the energy value of internal feeds. The implementation of energy-protein supplements during transition and winter periods is advisable to increase average daily gains and reduce the specific cost of feed.

To maximize the realization of slaughter potential, it is necessary to implement regular monitoring of live weight and Body Condition Scoring (BCS). This will allow for a more accurate determination of optimal slaughter dates for each group of animals, ensuring the highest slaughter yield and profitability.

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