

COMPARATIVE STUDY OF PRODUCTION TRAITS IN ABERDEEN ANGUS CATTLE RAISED UNDER SEMI-INTENSIVE AND EXTENSIVE SYSTEMS IN ROMANIA

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Abstract

This study evaluates the production performance of Aberdeen Angus cattle under semi-intensive and extensive management systems in Romania. The research analyzed key production traits, including birth weight and average daily gain at 120, 200, and 365 days, for both sires and dams in two herds located in Botoșani and Vaslui counties. Data from 27 sires and 27 dams in the semi-intensive system and 15 sires and 15 dams in the extensive system were collected from the Romanian Aberdeen Angus Herdbook and farm records. Statistical analysis was performed using S.A.V.C. software, calculating arithmetic means, standard errors, standard deviations, coefficients of variation, and minimum and maximum values. Results revealed differences in performance between the two systems, with the semi-intensive system generally showing superior early growth rates, particularly in sires. However, dams in the extensive system demonstrated higher birth weights and competitive growth rates. The study provides valuable insights into the adaptability of Aberdeen Angus cattle to different management conditions in Romania, offering guidance for optimizing breeding programs and management strategies in the growing Romanian beef sector. These findings contribute to the understanding of genotype-environment interactions in beef production systems and support informed decision-making for producers aiming to improve productivity and meet market demands efficiently.

Key words: Aberdeen Angus, extensive system, growth performance, Romanian beef production, semi-intensive system

INTRODUCTION

The beef cattle sector in Romania is experiencing significant growth as producers aim to meet increasing consumer demand for high-quality meat products [1]. Within this expanding industry, the Aberdeen Angus breed has gained popularity due to its adaptability and excellent carcass traits [2]. However, the performance of Angus cattle can vary considerably depending on the management system and environmental conditions [3].

This study seeks to evaluate and compare the production performance of

Aberdeen Angus cattle raised under two distinct management systems in Romania - extensive and semi-intensive. By analyzing key production traits of the ancestry in two Angus herds, we aim to assess the degree of genetic improvement and adaptability of the breed to different rearing conditions in the studied areas [4].

Specifically, birth weight, average daily gain at 120 days, 200 days, and 365 days were examined for both, sires and dams, in a semi-intensive system in Botoșani County and an extensive system in Vaslui County. Comparing these traits between farms and

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management systems provides valuable insights into the breed's performance potential under varying levels of inputs and environmental challenges [5].

Understanding how Angus cattle respond to different production systems is important for optimizing management practices and breeding programs in Romania's growing beef sector [6]. This research contributes important data to inform producers on expected performance across systems as they work to increase productivity and meet market demands efficiently.

The findings of this comparative analysis will help guide breeding decisions, feeding strategies, and overall herd management to maximize the genetic potential of Angus cattle under Romanian conditions [7]. Furthermore, it provides a foundation for future studies on the interactions between genetics and environment in beef production systems [8].

MATERIAL AND METHOD

This comparative study focused on two Aberdeen Angus cattle herds raised under different management systems in Romania, following established methodologies for evaluating beef cattle performance [9]. The research was conducted on farms located in Botoșani and Vaslui counties, representing semi-intensive and extensive production systems, respectively.

The semi-intensive system, operated by SC Agricola Miron SRL in Cozmești village, Stolniceni Prăjescu commune, Iași county, maintained a herd of 280 animals. The extensive system, managed by I.I. Fudulache Ioan in Cașin village and commune, Bacău county, was also included in the study. Both farms participated in the official performance recording program for beef cattle, adhering to national standards for data collection [10].

Data were collected from the Romanian Aberdeen Angus Herdbook and farm

records, following protocols established by the Romanian Agency for Animal Husbandry [11]. The following production traits were analyzed for both sires (T) and dams (M), in line with international standards for beef cattle evaluation [12]:

1. Birth weight (kg)
2. Average daily gain at 120 days (g)
3. Average daily gain at 200 days (g)
4. Average daily gain at 365 days (g)

For the semi-intensive system, data from 27 sires and 27 dams were analyzed. The extensive system analysis included 15 sires and 15 dams, providing a representative sample for statistical analysis [13].

Statistical analysis was performed using the S.A.V.C. (System for Analysis and Valorification of Characters) software developed by Prof. Dr. Vasile Maciuc at the University of Life Sciences "Ion Ionescu de la Brad" in Iași [14]. The following statistical parameters were calculated for each trait, as recommended by Popa (2009) [13]:

- Arithmetic mean (\bar{x})
- Standard error of the mean ($\pm s\bar{x}$)
- Standard deviation (s)
- Coefficient of variation (V%)
- Minimum and maximum values

Additionally, Fisher's test and Tukey's test were employed to assess the significance of differences between groups, following standard statistical procedures for animal science research [15].

The study adhered to all ethical guidelines for animal research, ensuring the welfare of the cattle throughout the data collection process. All procedures were carried out in compliance with Romanian regulations for animal husbandry and research, as outlined by the National Sanitary Veterinary and Food Safety Authority [16].

The comparison of key production traits between the two management systems aimed to evaluate the adaptability and performance potential of Aberdeen Angus cattle under different environmental and

management conditions in Romania. This analysis provides valuable insights for optimizing breeding programs and management strategies in the growing Romanian beef sector [6].

RESULTS AND DISCUSSIONS

The analysis of production traits in Aberdeen Angus cattle raised under semi-intensive and extensive systems (Tab. 1) revealed notable differences in performance.

Table 1. Comparison of production traits between semi-intensive and extensive systems

Trait		Semi-intensive ($\bar{x} \pm s\bar{x}$)	Extensive ($\bar{x} \pm s\bar{x}$)
Birth weight (kg)	T	40.52 \pm 0.274	36.20 \pm 0.835
	M	26.93 \pm 0.106	35.67 \pm 0.887
ADG 120 days (g)	T	1284.33 \pm 9.674	1179.60 \pm 44.583
	M	894.78 \pm 15.966	1018.20 \pm 62.418
ADG 200 days (g)	T	1137.81 \pm 7.724	1108.80 \pm 26.874
	M	971.54 \pm 9.258	906.67 \pm 34.459
ADG 365 days (g)	T	1113.22 \pm 12.117	975.93 \pm 32.918
	M	899.73 \pm 17.158	901.53 \pm 20.764

ADG: Average Daily Gain

Birth Weight: Sires in the semi-intensive system showed higher birth weights (40.52 \pm 0.274 kg) compared to those in the extensive system (36.20 \pm 0.835 kg). Interestingly, dams in the extensive system had significantly higher birth weights (35.67 \pm 0.887 kg) than those in the semi-intensive system (26.93 \pm 0.106 kg). This substantial difference might be attributed to genetic variation between the herds or differences in maternal nutrition during gestation.

Average Daily Gain (ADG): At 120 days, sires in the semi-intensive system demonstrated superior growth (1284.33 \pm 9.674 g/day) compared to those in the extensive system (1179.60 \pm 44.583 g/day). However, dams in the extensive system showed higher ADG at 120 days (1018.20 \pm 62.418 g/day) than those in the semi-intensive system (894.78 \pm 15.966 g/day). This pattern suggests that the semi-intensive system may provide better conditions for early growth in male calves, while the extensive system appears to favor female calf growth during this period.

For ADG at 200 days, both sires and dams in the semi-intensive system outperformed those in the extensive system.

This indicates that the semi-intensive management practices may offer advantages for sustained growth up to weaning age.

The ADG at 365 days was only available for the extensive system, limiting direct comparisons. However, the values for both sires (975.93 \pm 32.918 g/day) and dams (901.53 \pm 20.764 g/day) in the extensive system suggest good growth potential even under less intensive management. **Variability in Performance:** The coefficient of variation (V%) was generally higher in the extensive system, particularly for ADG traits. This increased variability could be attributed to less controlled environmental conditions and nutrition in extensive systems, leading to more diverse individual responses.

These findings align with previous studies on Aberdeen Angus performance in Romania. Grigore et al. (2019) reported similar ADG values for Angus cattle in semi-intensive systems, while Acatincai et al. (2017) found comparable growth rates in extensive systems. The higher variability observed in our extensive system is consistent with observations by Nistor et al. (2020), who noted greater performance fluctuations in less controlled environments.

The superior early growth of sires in the semi-intensive system suggests that this management approach may be more suitable for maximizing the genetic potential for growth, particularly in male calves. However, the strong performance of dams in the extensive system, especially in early growth, indicates that Angus cattle can adapt well to less intensive management, which may be economically advantageous in certain regions.

These results highlight the importance of considering both genetic potential and environmental factors when designing beef production systems. While semi-intensive management appears to offer some advantages in growth performance, the adaptability of Angus cattle to extensive systems should not be underestimated.

Future research should focus on long-term productivity, including reproductive traits and carcass quality, to provide a more comprehensive comparison between these management systems. Additionally, economic analyses would be valuable to determine the cost-effectiveness of each system in the Romanian context.

This study demonstrates that Aberdeen Angus cattle can perform well under both semi-intensive and extensive management in Romania, with each system offering distinct advantages. These findings can guide producers in optimizing their management strategies based on their specific resources and production goals.

CONCLUSIONS

This comparative study of Aberdeen Angus cattle raised under semi-intensive and extensive systems in Romania yields several important insights:

1. **System Influence on Growth:** The semi-intensive system demonstrated superior performance in early growth stages, particularly for sires. This suggests that more controlled environments may better support the expression of genetic

potential for growth in Aberdeen Angus cattle.

2. **Adaptability of Angus Breed:** Despite differences, both systems showed satisfactory growth performance, highlighting the adaptability of the Aberdeen Angus breed to varied management conditions in Romania.
3. **Gender-Specific Responses:** Interestingly, dams in the extensive system showed higher birth weights and early growth rates compared to those in the semi-intensive system, indicating potential gender-specific responses to management intensity.
4. **Variability in Extensive Systems:** Greater variability in performance was observed in the extensive system, particularly for average daily gain traits. This underscores the importance of individual animal management in less controlled environments.
5. **Long-term Growth Patterns:** While the semi-intensive system showed advantages in early growth, the differences between systems became less pronounced by 365 days, suggesting a potential for compensatory growth in extensive systems.
6. **Breeding Program Implications:** The observed differences in performance between systems and genders provide valuable information for tailoring breeding programs to specific production environments in Romania.
7. **Economic Considerations:** The ability of Angus cattle to perform well in both systems offers flexibility for producers to choose management strategies based on their resources and market demands. These findings contribute to the growing body of knowledge on beef cattle production in Romania and can guide future research on optimizing management practices, breeding strategies, and economic efficiency in the expanding Romanian beef sector.

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