

## STUDY OF THE AGE AT FIRST CALVING IN ABERDEEN ANGUS BREED

M.C. Rotar<sup>1\*</sup>, R.Ş. Pelmuş<sup>1</sup>, M.A. Gras<sup>1</sup>, C. Van<sup>1</sup>

<sup>1</sup>National Research-Development Institute for Animal Biology and Nutrition,  
Calea Bucureşti No. 1, 077015, Baloteşti, Romania

### Abstract

The aim of this paper was the estimate the breeding value of the age at first calving in a population from Aberdeen Angus breed. This breed is the most widespread and appreciated beef breed in the world. The age at first calving is an important economic trait in beef breeds. The age at first calving influences the production traits in beef breeds. Aberdeen Angus cows are characterized by precocity. The data were from 329 cows from Aberdeen Angus Association Romania. The mean value and standard error for age at first calving in the studied population was  $830.34 \pm 4.86$  days. This trait depends on the management of the farm. The information source for breeding value estimation was own performance. The breeding values for age at first calving ranged between -21.868 and 33.932 days. The method of selection of cows for age at first calving from the studied population was the selection on own performances. The improve of this trait can be realized by choice of the best cows for reproduction.

**Key words:** age at first calving, beef cattle, breeding value

### INTRODUCTION

Aberdeen Angus is a beef breed appreciated for the quality of meat. This breed has precocity having the first calving at 24-27 months. The age at first calving is important because increase the productive longevity of cows, yield and profitability. Fertility can be quantified by the number of viable offspring per unit of time [1]. The reproduction indicators with direct implications on meat production in beef cattle are age at first calving and calving interval. For females, the determinants of fertility are: the age at first calving, the number of offspring at calving, the viability of offspring, the length of reproductive life and the calving interval [2]. The reproductive traits have a double importance from the point of view of breeding: these traits are economically useful and indirectly affect the selection

efficiency. The reproductive traits have low heritability and are influenced by the special environment and non-additive interaction [2]. The cows have more progeny and the profitability of farms increases. The age at first calving is different in beef cattle: Hereford 2.23 years, Galloway 2.30 years, Simmental 2.64 years, Charolais 2.87 years, Limousine 2.90 years [3]. In the breeding program of Aberdeen Angus breed are include the reproduction traits. The criteria selection for reproduction females are: body weight, age, conformation, state of health, fertility. The optimal age of cows at first calving is conditioned by the level of forage and the precocity of the breed. By improving the age at first calving in Aberdeen Angus breed improves economic and environmental sustainability of farms. The profit of farms increases for heifers calving between 24-27 months in Aberdeen

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\* Corresponding author: catalin.rotar@ibna.ro

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Angus breed. Is more profitable for Aberdeen Angus beef herds to have the age at first calving at 24 months. The heifer enters to reproduction when her weight is 70% of cow adult weight. The aim of this paper was the estimate the breeding value of the age at first calving in a population from Aberdeen Angus breed.

## MATERIAL AND METHOD

The data consisted in performances for age at first calving of 329 cows from a population from Aberdeen Angus breed. The data were from Aberdeen Angus Association Romania.

The breeding value of the candidate of selection was deduced based on its own phenotype. The equation used to predict the breeding value was the following [2]:

$$A_i = h^2 * (P_i - \mu_p)$$

Where:

$A_i$  = the breeding value of cow

$h^2$  = the heritability

$P_i$  = the performance of cow

$\mu_p$  = the mean oearf the population knowing that:

$$b_{A,P} * V_p = \text{cov}(A,P)$$

$$b_{A,P} = \frac{\text{cov}(A,P)}{V_p} = h^2$$

$b_{A,P}$  = the regression of the breeding value of the selection candidate against its own phenotype

$V_p$  = phenotypic variance

$\text{cov}(A, P)$  = covariance between breeding value and phenotype

The relative breeding value is:

$$BV\% = 100 + 12 * \left( \frac{BV_{abs} - \text{Average } BV_{abs}}{\sigma_{BV_{abs}}} \right)$$

$BV\%$  = relative breeding value

$BV_{abs}$  = absolute breeding value

$\sigma_{BV_{abs}}$  = standard deviation of absolute breeding values

For age at first calving were included the values ranged between 721 and 1000 days.

## RESULTS AND DISCUSSIONS

The factors which influenced the age at first calving were: the breed, individual, nutrition.

The statistics for age at first calving traits were presented in Table 1.

Data from table 1 indicate a mean of 830.34 days for age at first calving and a standard error 4.86 for Aberdeen Angus population. The coefficient of variability was 10.62% indicating the homogeneity of the population. The standard deviation was 88.18 days. The minimum limit of age at first calving was 721 days and the maximum limit was 1000 days. There is economic and environmental benefit of reducing age at first calving in Aberdeen Angus herds due to lower costs of feed.

Dakay et al. (2006) reported a mean of 2.76 years in Aberdeen Angus population. The mean value for age at first calving from our study was lower than the value obtained by Dakay et al. (2006). The age at first calving was different in populations of Aberdeen Angus population because the populations have different genetic background, herd management approaches and the preference of individual breeders. Brzakova et al. (2020) [4] reported the age at first calving in Aberdeen Angus breed from Czech Republic 756.133 days. The value from our study was higher than the mean value reported by Brzakova et al. (2020). Borman and Wilson (2010) [5] reported a lower mean in Aberdeen Angus population. Marton et al. [6] (2024) reported the mean age at first calving in Aberdeen Angus population of 869 days.

Larracharte et al. (2021) [7] reported average first calving age 34.7 months in Aberdeen Angus breed. The age at first calving was different in different countries because are differences in herd management, feed and climate (Slyziene et al., 2023) [8].

There are some advantages of mating heifers at 15 months to calve at 24 months: heifers mated as yearlings produce more calves in their life in the herd, the high producing cows can be identified earlier which allows for a shorter generation interval and quicker genetic progress.

In other beef breeds the age at first calving presents different values. Lazaro et al. (2018) [9] reported the mean for age at first calving 1825 days of age in Brazilian Brahman cattle and considered that age at first calving is one of the most important selection criteria for genetic improvement of female reproductive efficiency. Claus et al. (2017) [10] reported the mean age at first calving 33.36 months in Nelore breed. Gutierrez et al. (2002) [11] found the mean age at first calving was 1063.48 days.

In dairy breed, in Holstein breed the average at first calving was 26.09 months (Ferrari et al., 2023) [12].

Table 1 Descriptives statistics for age at first calving

Trait	No. of cows	Mean ± standard error	Standard deviation	CV (%)
Age at first calving	329	830.34±4.86	88.18	10.62

Figure 1 show the distribution of first calving during the two year of evaluation and we can observe that in year 2021 were with 30% more animals that in year 2022.

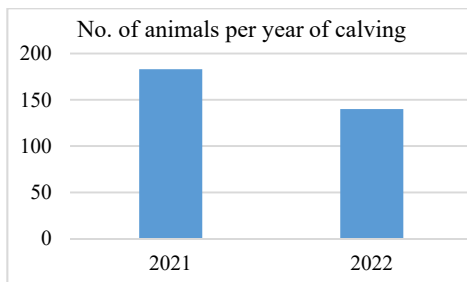


Figure 1 – Distribution of animals during years of calving

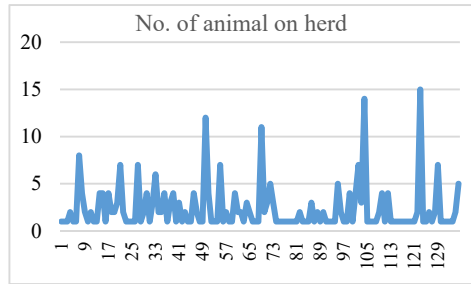


Figure 2 – Distribution of cows on herds

The distribution of animals within herds it is important because based on that we can know the contemporary groups and see where are the most relevant groups. The herds with a higher number of animals will have a more precise average for correcting the breeding values. The figure 2 shows that most herds had only 5 animals for the contemporary groups. When an contemporary group it is formed only by 2 animals, they will have a correction for their phenotype based only for that average and the breeding values can be more biased that the ones obtained from a higher contemporary group.

Figure 3 it is just showing the distribution of animals based on their phenotypic records (days at first calving) and it can be observed that the majority of the animals are ranging between 790 days and 850 days.

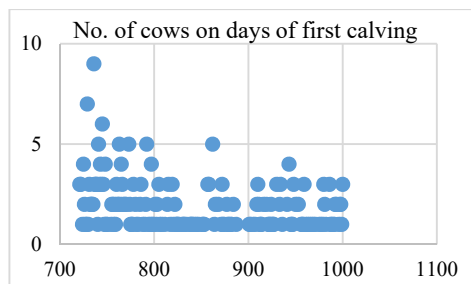


Figure 3 – Distributions of cows on days of calving

Early nutrition and genetics influence the age beef heifers reach puberty [13].

In the table 2 were presented the absolute and relative breeding values for the best cows for age at first calving. The selection criterion for choosing the candidates for the selection is based on an estimate of the breeding value whose information source is the own performance expressed as a deviation from the population average [2]. The relative breeding values higher than 100 shows that the cows are the best for age at first calving and their progeny will be characterized by shorter age at first calving. The relative breeding values of the best cows for age at first calving ranged between 113.51 and 114.87. The breeding values for age at first calving in studied population of Aberdeen Angus breed from our study ranged between -21.868 and 33.932 days. Borman and Wilson (2010) [5] reported the average, minimum and maximum estimated breeding values for sires of heifers for 3 adjustments (30, 60, 90) were -0.6, -46.6 and 45.9; -1.2, -50.1 and 51.6; -1.7, -52.9 and 56.7 in Aberdeen Angus breed.

Brazakova et al. (2020)[4] reported that selection for a higher breeding value is an effective way of improving fertility traits.

Table 2 The breeding value of the 10 best cows for age at first calving

No.	Breeding values for the best cows	Relative breeding values for the best cows
1	-21.868	114.87
2	-21.668	114.74
3	-21.268	114.46
4	-21.068	114.33
5	-20.868	114.19
6	-20.668	114.06
7	-20.468	113.92
8	-20.268	113.78
9	-20.068	113.65
10	-19.868	113.51

## CONCLUSIONS

The breeding values of cows for age at first calving are important for selection the best animals. A good management decision can be made only on precise information and based on calculation, for that the best method is to select for reproduction only that cows that have higher breeding values. The cows from the studied population from Aberdeen Angus breed had a good precocity.

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