

RESEARCH ON GENETIC PROGRESS OF THE ABERDEEN ANGUS BREED IN ROMANIA

Ioan Teodor GOCIMAN¹, Gheorghe Emil MĂRGINEAN¹, Stelian BĂRĂITĂREANU¹,
Mirela Aurora CĂRĂTUȘ², Livia VIDU¹

¹University of Agronomic Sciences and Veterinary Medicine of Bucharest, 59 Marasti Blvd,
District 1, Bucharest, Romania

²Lucian Blaga University of Sibiu, Sibiu, Romania

Corresponding author email: gociman.ioan@yahoo.com

Abstract

The Herdbook is the tool for the genetic progress of Aberdeen Angus cattle, which aims to improve the performance of the breed in Romania. The specific activities of the Herdbook are performed by the Romanian Aberdeen Angus Association in accordance with the legal provisions in force and according to ICAR - International Committee for Animal Recording. The centralization, storage and evaluation of all information for Aberdeen Angus cattle in Romania enrolled in the breeding program is done only in the software "BIDAA - Informatic Database of Aberdeen Angus". The Herdbook represents a database of ascendants, contemporaries and descendants of Aberdeen Angus cattle in Romania. Logistics and permanent monitoring for the issuance of Pedigree's, creating a database with D.N.A. of breeding bulls for verifying/establishing the identity, cattle ancestry, calculating estimated breeding values, realization type classification, authorization of the bulls and other activities to achieve the goals of the Romanian Aberdeen Angus Breeding Program.

Key words: Aberdeen Angus, Herdbook, progress genetic.

INTRODUCTION

All the activity of the Herdbook is coordinated and specified in the Romanian Aberdeen Angus Breeding Program which includes all the necessary information for farmers and collaborators, having as main purpose the genetic progress and the improvement of the Aberdeen Angus breed in Romania. Romanian Aberdeen Angus Association is the only one accredited for the services of drawing up and maintaining the Herdbook of the Aberdeen Angus breed in Romania, accreditation no. 7/18.11.2015.

The organization chart of the Aberdeen Angus Herdbook correlates and is subject to the performance objectives of the breeding program. Any modification, copying or appropriation of the official documents of the Romanian Aberdeen Angus Association is false and is punishable according to the legislation in force.

The identification of the animals covered by this breeding program will be carried out in accordance with International Committee for

Animal Recording, European and national legislation.

The Aberdeen Angus breed Herdbook in Romania recognizes the official information and documents of origin coming from other Herdbooks that respect the European legislation. Members have the obligation to send documents (annexes) every three months or to enter in the software program BIDAA (Informatic Database of Aberdeen Angus) all farm events - mounts, calving, sales and slaughtering.

Failure to comply with the rules of this improvement program has the following consequences for breeders: minutes (warnings) are drawn up if the farmer does not comply with the weighing control data in farm, does not send the notification documents on time (annexes), does not pay the invoices on time.

For the registration of an animal from another Herdbook it is necessary to present the completed documents certificate in accordance with Commission Decision 2005/379/EC and Regulation no. 1012 of June 8, 2016 of the European Parliament and of the Council of the

European Union resulting in the entry in a section of the Herdbook.

In Romania, the Aberdeen Angus breed first appeared during the years 1958-1961, breeding bulls being brought to be used in industrial crosses with poorly productive cows from local breeds in order to obtain hybrids with good results for beef production.

The first embryo transfer was made in 2000 at the Zănești farm of those from TCE 3 Brazi Piatra Neamț. Cattle from the Romanian Simmental, Holstein and Brown breeds were synchronized and the embryos were brought by Dr. Popescu Alexandru, Dr. Parchițianu Ioan Vasile and Prof. Robertson from the United States of America. These were just two uninterrupted initiatives for the Aberdeen Angus breed in Romania. During 2008, the first massive import of Aberdeen Angus cattle from Germany took place. It was a group of 120 heifers, who found their new shelter on a newly established farm near Sibiu, Transylvania. Due to fluctuations and the general decline in the price of a litre of milk, many farmers later began to opt for crosses and purchases of Aberdeen Angus cattle. Romanian Aberdeen Angus Association currently has over 1100 members from all regions of the country who own over 70.000 Aberdeen Angus cattle. Romania has recently become the country with the largest herd of Aberdeen Angus cattle in Europe (Gociman, I. et al., 2019; Vidu, L. et al., 2015).

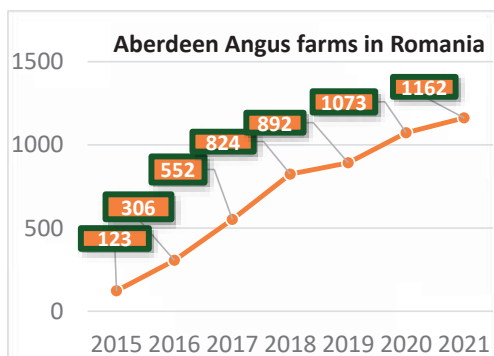


Figure 1. Evolution of Aberdeen Angus farms in the Herdbook

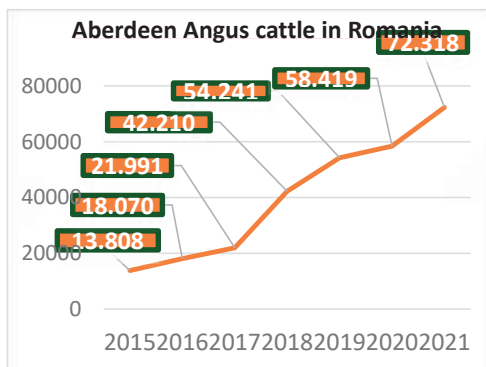


Figure 2. Evolution of Aberdeen Angus cattle in the Herdbook

MATERIALS AND METHODS

The official performance control for meat production is carried out by the control methods A, B and C. There are two mandatory controls weighing per year for calves from 90 days until 410 days old like International Committee for Animal Recording rules. All these performance weights are then sent to the Herdbook where they will be calculated reference weights, average daily gain and estimated breeding values.

With this performance we calculate for four traits like International Committee for Animal Recording rules for birth weight, weaning weight seven months, ten months and twelve months.

Directions and objectives in the improvement of the Aberdeen Angus breed in Romania

1. Maintaining reproductive precocity.
2. Development of reproductive parameters such as: fecundity, fertility, vitality and viability.
3. Low specific consumption for achieving large average daily gain increases (ADG).
4. Obtaining cattle that ensure a superior quality of the carcass.

Table 1. Objectives of the Romanian Aberdeen Angus Breeding Program

Character	Desired type in the future	Current herd performance	Improvement Objectives
Birth weight	25 kg	30 kg	Decreased birth weight
Weaning weight of breeding bulls	230-260 kg to 200 days	200-220 kg to 200 days	Improving the weight of bulls
Calf weaning weight	200-220 kg to 200 days	165-185 kg to 200 days	Improving the weaning weight of breeding calves
Weight at 10 months	340-360 kg to 300 days	290-310 kg to 300 days	Improving the weight of bulls
Weight at 12 months	430-460 kg to 365 days	380-400 kg to 365 days	Improving the weight of breeding calves

The objectives of improving the number of Aberdeen Angus cattle in Romania according to the market and farmers requirements, current and future are defined (Table 1). For these characters, improvement values will be calculated with the B.L.U.P. method.

Before the official performance control for meat production in the Aberdeen Angus breed begins, the origin of each animal must be certified (validated) and entered only in the software program BIDAA, granted by the Romanian Aberdeen Angus Association for calculation and estimation of performance for the genetic value of an animal (estimation method that contains the relation between the cattle population traits and the performance traits of each one – animal model Henderson - B.L.U.P.). The identification and individualization are attributed to the breeders to ensure the notification documents.

Total selection index:

$$EBV \text{ Total} = 0\% * EBV \text{ birth} + 40\% * EBV \text{ weaning-200 days} + 30\% * EBV \text{ 300 days} + 30\% * EBV \text{ 365 days}$$

Following the genetic evaluation, the cattle will be chosen for breeding in descending order based on the EBV total according to the needs of each farmer. For each character, improvement values will be calculated by the BLUP method.

In order to define a broader framework for genetic evaluation of animals, compared to the selection index (BLP) method, Henderson (1949, 1963 and 1973) developed a statistical methodology for the simultaneous evaluation of

the fixed and random effects of the mixed model, called BLUP - Best Linear Unbiased Predictors (method of the best unbiased linear predictors).

The Herdbook of the Aberdeen Angus breed is divided as follows:

- Youth class

a) Subclass of calves:

- all males up to the age of seven months, coming from parents registered in the main section and who are 100% purebred Aberdeen Angus, will be enrolled in the youth class;

- all females up to the age of seven months, from parents registered in the main section and who are 100% purebred Aberdeen Angus;

- all females up to the age of seven months (at least 93.75% F4 Aberdeen Angus) from the additional section mothers (minimum 87.5% F3 Aberdeen Angus) and the father from the main section 100% Aberdeen Angus.

b) Subclass A:

- male and female youth originating over two generations with parents and grandparents enrolled in the main section;

- ADG - average daily gain increase over 700 g females; 900 g males at any weighing;

- percentage of 100% Aberdeen Angus blood;

- minimum age 7 months.

c) Subclass B:

- male and female youth originating over two generations with parents and grandparents enrolled in the main section, Aberdeen Angus 100% blood percentage;

- female youth of two generations originating from a purebred father and a mother of the following ancestry; the mother and maternal grandmother registered in the supplementary section and the father and the two grandparents registered in the main section. Aberdeen Angus blood percentage minimum 93.75% (F4);

- male and female youth who do not meet the performance requirements for admission to the youth class - subclass A;

- minimum age 7 months.

- Bull class

a) Subclass A:

- they come from the main section of the youth class subclass A, originate for two generations and are 100% Aberdeen Angus;

- ADG - average daily gain increase of at least 900 g. for recorded weighings;
- DNA or any other test based on DNA genome analysis;
- have estimated breeding value;
- type classification - minimum score, average 7 in each category.

b) Subclass B:

- they come from the main youth class section, originate for two generations with parents and grandparents in the main section and are 100% Aberdeen Angus;
- males that do not meet the admission performances in the bull class - subclass A;
- DNA or any other test based on DNA genome analysis;
- have estimated breeding value.

- Cow class

a) Subclass A:

- they come from the main section youth class subclass A, originate over two generations and be 100% Aberdeen Angus;
- ADG - average daily gain increase over 700 g at any weighing;
- have estimated breeding value;
- type classification - minimum score, average 6 in each category.

b) Subclass B:

- they come from the main section youth class subclass B, originate over two generations and be 93.75% Aberdeen Angus, the father to come from the main section;
- females that do not meet the admission performances in the cow class - subclass A;
- have estimated breeding value.

Additional youth class - commercial

- crossbreed young females to be obtained by crossbreeding with the Aberdeen Angus breed (young female F2 75% Aberdeen Angus and F3 87.5% Aberdeen Angus). Must have documents certifying the origin of the Aberdeen Angus breed;
- females until the first calving;
- ADG average daily gain increase over 500 g at any weighing;
- have the *akeratos* character specific to the Aberdeen Angus breed.

Additional cows' class - commercial

- crossbreed females with Aberdeen Angus after the first calving (females F1 50% Aberdeen Angus after a first calving);
- mixed-breed females obtained by absorption crossing which are the subject of the Herdbook (females F2 75% Aberdeen Angus and F3 87.5% Aberdeen Angus);
- ADG average daily gain increase over 500 g. at any weighing;
- have the *akeratos* character specific to the Aberdeen Angus breed;
- they have registered at least one calving.

In order to receive the pedigree, the Aberdeen Angus cattle in Romania must respect the following aspects:

For females:

- Minimum age - 12 months;
- The origin is known for two generations;
- The birth weight is known;
- The race percentage should be at least 93.75% Aberdeen Angus (F4).
- It is known at least one weight for a reference age, and the average daily gain increase is at least 600 g/day;
- They come from a father authorized for natural mounting/artificial insemination and DNA testing;
- Females older than 32 months must have registered a calf;
- The name is known (farm name + mother's name + letter assigned internationally to the year of birth + last 3 digits of the ear tag).

For males:

- Minimum age 12 months;
- The origin is known for two generations;
- The birth weight is known;
- The race percentage must be 100% Aberdeen Angus;
- It is known at least the weight at 200 days and/or 365 days, and the average daily gain increase is at least 900 g/day;
- They have DNA profiles;
- The name is known (farm name + father's name + letter assigned internationally to the year of birth + last 3 digits of the ear tag).
- Letters allocated internationally at the year of birth: for 2015 - letter R, year 2016 - letter S, year 2017 - letter T, year 2018 - letter U, year 2019 - letter V, year 2020 - letter W, year 2021

- letter X, year 2022 - letter Y, year 2023 - letter Z.

Type classification is made for the next traits:

1. Chest development;
2. Width of the forelimbs;
3. The aplomb of the forelimbs;
4. The aplomb of the hind limbs;
5. The size of the front train compared to the rear one;
6. Horizontal line withers - croup;
7. Clamping and circumference of the scrotum;
8. Head development;
9. Functional skills (locomotion).

Arithmetic mean total/final grade

Observations: For each character a score from 1 to 9 is given.

Measure:

Scrotal circumference (cm)

Height at withers (cm)

Height at croup (cm)

Chest depth (cm)

Hail length-tail grip (cm)

Weight (kg)

Spots/Horns

Temperament

Within the Romanian Aberdeen Angus Association, the reproduction bulls are authorized only if they have a pedigree, respect the characters of the Aberdeen Angus breed, are healthy, have type classification, have a DNA profile of maternal and paternal origin (Grosu and Gociman, 2018).

In order to be admitted for breeding, Aberdeen Angus cattle in Romania must comply with the following parameters:

Table 2. Reproduction parameters

Reproduction parameter	Number of days
Minimum gestation time	263
Maximum gestation time	297
Minimum number of days between two consecutive calvings (calving interval)	305
Minimum difference between the age of the mother and the calf	720
The minimum difference between the age of the father and the calf	720
Minimum sexual cycle	18
Maximum sexual cycle	28

If the reproductive parameters are not met, DNA tests must be performed confirming maternal and/or paternal origin. D.N.A. profile and parentage are made with the Microsatellite method with authorized laboratory.

RESULTS AND DISCUSSIONS

With all these objectives and rules of the Romanian Aberdeen Angus Breeding Program in the following tables you will find the genetic progress for the four quantitative traits: birth, weaning 200 days, 300 days and 365 days.

In the following graphic (Figure 3) you can find the evolution of the birth weight for the Aberdeen Angus youth cattle in 2018, 2019 and 2020. The average birth weight was 30.8 kg in 2018, 30.9 kg in 2019 and 30.7 kg in 2020.

For Aberdeen Angus breed in Romania, we want high calving ease as possible with calves that are easily fattened having subsequently a significant average daily gain.

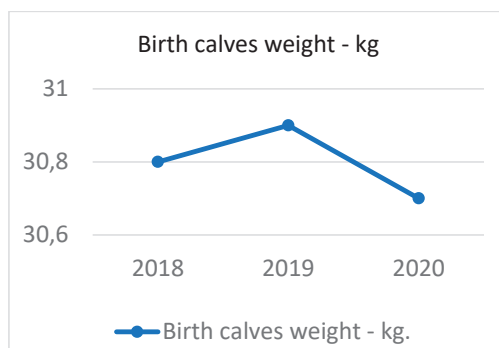


Figure 3. Evolution of birth calves' weight

In the following graphic (Figure 4) is the evolution of weights at seven months, ten months and twelve months for the Aberdeen Angus youth cattle in 2018, 2019 and 2020. The average weight at seven months was 206 kg in 2018, 206 kg in 2019 and 216 kg in 2020. Until this age, the calves are with their mothers, weaning taking place after seven months. The average weight at ten months was 281 kg in 2018, 285 kg in 2019 and 292 kg in 2020. The average weight at twelve months was 321 kg in 2018, 320 kg in 2019 and 383 kg in 2020.

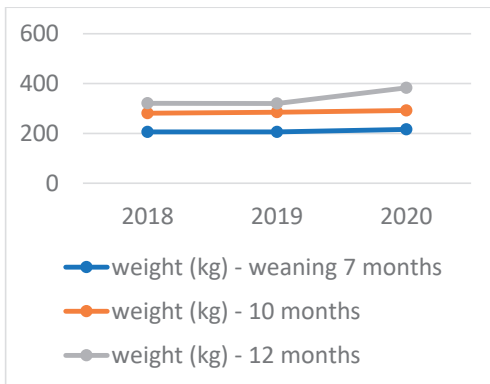


Figure 4. Evolution of weights

In the following graphic (Figure 5) is the evolution of average daily gain ADG at seven months, ten months and twelve months for the Aberdeen Angus youth cattle in 2018, 2019 and 2020. The average daily gain at seven months was 884 g in 2018, 879 g in 2019 and 927 g in 2020. The average daily gain at ten months was 833 g in 2018, 845 g in 2019 and 873 g in 2020. The average daily gain at twelve months was 795 g in 2018, 794 g in 2019 and 960 g in 2020. From year to year is an increase in the number of Aberdeen Angus reactive cattle, they better withstand the stress of weaning and this is seen in the evolution of performance.

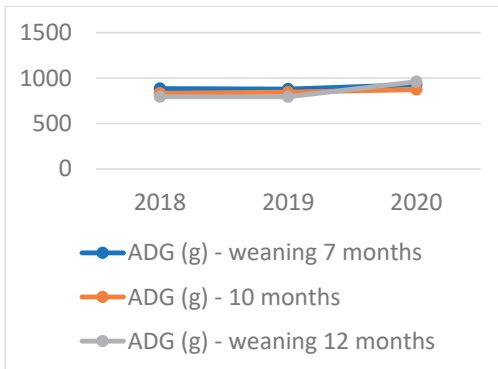


Figure 5. Evolution of average daily gain ADG

As can be seen in the graphs above, the Aberdeen Angus breed in Romania had a performance improvement every year for the four characters weight and/or average daily gain at birth, seven months, ten months and twelve months. Both, weights and average daily gain is influenced by internal factors such

as genetics, physiological, species, race, age, sex and external factors such as environment, feed, water, breeding season, calving season and technology (Gociman et al., 2020).

CONCLUSIONS

Romanian Aberdeen Angus Association has complied with the Romanian Aberdeen Angus Breeding Program with annual genetical performance progress.

The large areas of natural meadows, the climate, the relief, the variation of precipitations, the soil, the quality of the fodder, are some of the great strengths of Romania to increase such a quality breed in an extensive system.

Romania has to become a European beef brand country.

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