

ASSESSMENT OF EXTERNAL APPEARANCE OF BLACK-MOTLEY COWS

Maria Kohut

Institute of Agriculture of Carpathian Region of National Academy of Agrarian Sciences of Ukraine

Abstract. The research was conducted on first-calf heifers of Black-Motley breed of Lviv region and consisted in the assessment of their body conformation by type according to a guide [Instruction...2012]. Results of the linear classification of animals showed body conformation differences among cattle of dairy type, which points to the necessity of further selective breeding to improve its external appearance. Characteristics of various cows that are descendants of Black-Motley bulls were assessed. The analysis of obtained results concerning external appearance characteristics showed that the studied animals had average height, while the tallest ones were descendants of a Derby bull. The descendants of Starbuck and Sheriff bulls had inborn errors such as a sloping rump, while those of Sheriff and Softwar bulls had poor fore udder attachment. The main drawback of the entire herd is highly raised rumps in Softwar and Sheriff descendants. However, it is worth noting that all of the descendants had a correct form of teats that were of cylindrical and conical shape and of average length with an optimum position of udder quarters in the middle.

Key words: cows, linear assessment, Ukraine, Black-Motley breed, external appearance

INTRODUCTION

Continuous improvement of the genetic potential of animals (achievement of a favorable phenotype) remains the purpose of selection in cattle breeding to this

Corresponding author: Maria Kohut, Institute of Agriculture of Carpathian Region of National Academy of Agrarian Sciences of Ukraine, Region 81115, Obroshyno village, Pustomyty distr., Lviv reg., Ukraine, e-mail: kohut_maria@ukr.net

[©] Copyright by Wydawnictwo Uczelniane Zachodniopomorskiego Uniwersytetu Technologicznego w Szczecinie, Szczecin 2015

day. Until recently, much attention was paid not only to ways of improving productivity, but also to the body conformation and functional characteristics of cattle (udder health, ease of calving, milking speed, temperament) [Dymnicki and Reklewski 1999, Czaplicka et al. 2003]. In many countries, however, body conformation features are currently given too little attention. Despite reaching a satisfactory dairy cow production, breeders suffer from problems associated with abnormal body structure [Liskun 1950, Prydorohin and Liskun 1951, Dymnicki and Reklewski 1999, Czerniawska-Piątkowska and Szewczuk 2006, Goncharenko 2006]. It should be remembered that increase in milk yield leads to growing demands to cattle body structure. The structure of legs and udder is of utmost importance as far as the duration of cow use is concerned [Czaplicka et al. 2003].

Western Ukraine's Black-Motley breed of cattle is part of the Black-Motley breed of Ukraine and was registered in 1996. The given breed was developed on the basis of local Black-Motley cattle using Dutch and Holstein bulls of European and partially American selection. This breed is 75% Holstein. The duration of productive use of these cows is more than 4 lactations, and the productivity of fully-aged cows is 8–10 thousand kilos of milk with a fat content of 3.8%.

The assessment of body conformation of cattle is included in the breeding index of many countries (e.g. the Netherlands, the USA, Germany, UK) [Cue et al. 1996]. According to Vukašinović et al. [1995] and Mrode et al. [2000], there is a strong connection between body conformation and production. Kruszyński et al. [2006] have also demonstrated a high genetic correlation between milk yield and external appearance, type and conformation as well as the general assessment of the whole population in the Polish Black-and-White and Red-and-White cows in Poland. The authors found slightly weaker correlations between milk yield and height at hips, width and depth of chest and udder shape. The weakest correlations were found between milk yield and linear characteristics of the udder.

The assessment of external appearance, or linear assessment of cows by type, which is consistent with recommendations of ICAR international standards, is one of the strategies of improving milk herds in Ukraine. Selective breeding aims at developing cows with harmonious body structure, a well-expressed milk type with strong body conformation and physiological capacity of high milk yields.

The aim of this study is to assess first-calf heifers of Black-Motley breed by type according to a guide [Instruction...2012] according to two systems of assessment: a linear description of individual features of external appearance (using a 9-point scale) and the assessment of a complex of features using a 100-point scale.

MATERIAL AND METHODS

Our research, conducted in Lviv region, aimed at assessing first-calf heifers of Black-Motley breed by type according to a guide [Instruction...2012] according to two systems of assessment: a linear description of individual features of external appearance (using a 9-point scale) and assessment of a complex of features using a 100-point scale. The average intensity of a linear characteristic is evaluated at five points; minimally developed biological variations are reduced to one point, and if the development of a characteristic is close to the maximum, it is valuated at nine points. According to methodology, the score of 9 points is desirable for height at hips, width of chest, depth of body, angularity, width, weight, fore and rear udder attachment and central ligament.

The score of 5 points is desirable for manifestations of rump angle, rear leg angle, hoof angle, front and rear teat position and teat length. The researched material was analyzed according to Plokhinski [1969].

Daughters of Pilgrim bulls (group I), Derby bulls (group II) with line Elevation B Softwar lines (group III, Starbuck line) and B. Sherif bulls (group IV, line Bella) were assessed.

Each group consisted of 30 head of cattle (according to methodology, there should be no less than 30 cows representing the get of one bull). The study was carried out according to pedigree records as well as personal research. The external appearance of the group was investigated and assessed both according to absolute linear values using measurements in centimeters and by eye. The results of linear assessment of body conformation of cattle were entered in a linear assessment sheet (for milk and milk-meat breeds) by two experts. Identification number, nickname, date of birth and calving date were obtained from 2-Mol cards (cattle breeding cards). After obtaining the results, arithmetic values and probability coefficients were calculated according to Student.

The best among the evaluated bulls in the overall rating according to 100-point scale was Derby 80 stud bull, 1 point, which surpassed the descendants of Pilgrim, Softwar and B Sheriff bulls by 1.3, 3.3 and 2.9 points respectively.

RESULTS AND DISCUSSION

Descriptive characteristics of external appearance worth 9 points according to a 9-point scale are shown in Table 1. The tallest (height at hips) were the daughters of Derby bull (group II, $P \le 0.001$). The other stud bull gave its descendants the width and depth of chest assessed as averagely developed.

For dairy cows angular forms of the body are typical. For visual assessment of body angularity in the daughters of all the assessed bulls a 5-point scale evaluation

Table 1. A linear description of the individual characteristics of the exterior of cows heifers

| Linear characteristics of heifers | Group – Grupa | | | |
|--|----------------|--------------|------------------|--------------|
| Cechy liniowe jałówek | Ι | II | III | IV |
| Growth Wzrost | 5.1 ±0.10 | 6.2 ±0.14*** | 5.2 ± 0.06 | 4.8 ±0.06 |
| Chest width Szerokość klatki piersiowej | 5.0 ±0.12 | 5.5 ±0.10 | 5.0 ± 0.06 | 5.0 ±0.10 |
| Depth of the chest Głębokość klatki piersiowej | 5.5 ±0.14 | 6.8 ±0.11 | 5.0 ± 0.05 | 5.3 ±0.11 |
| Cutest | 5.0 ± 0.09 | 5.0 ±0.10 | 5.0 ±0.11 | 5.0 ±0.11 |
| Tilt buttock Ustawienie zadu | 5.0 ± 0.08 | 5.0 ±0.10 | 6.3 ±0.12 | 5.8 ±0.12 |
| Width of buttock Szerokość zadu | 5.3 ±0.13 | 6.5 ±0.12*** | 4.9 ±0.10 | 5.4 ±0.14 |
| Angle of the pelvic limb Skątowanie kończyn tylnych | 5.0 ± 0.11 | 4.8 ±0.14 | 5.0 ±0.09 | 5.0 ±0.11 |
| Posture of the pelvic limb Ustawienie kończyn tylnych | 5.1 ±0.12 | 5.2 ±0.09 | 5.3 ±0.11 | 5.0 ±0.10 |
| Angle of the hoof Ustawienie racicy | 4.4 ±0.14 | 4.6 ± 0.09 | 4.8 ±0.13 | 4.8 ±0.10 |
| Front attachment of the udder Przednie zawieszenie wymienia | 4.8 ±0.09 | 4.9 ±0.13 | $4.9\pm\!\!0.14$ | 5.3 ±0.09 |
| Udder attachment of the udder Tylne zawieszenie wymienia | 5.0 ± 0.11 | 5.6 ±0.11 | 4.7 ±0.09 | 4.8 ±0.11 |
| Central link Więzadło środkowe | 6.8 ±0.10 | 5.9 ±0.11 | 6.0 ± 0.05 | 5.5 ±0.07 |
| Depth udder Głębokość wymienia | 5.3 ±0.10 | 6.0 ± 0.07 | 5.2 ±0.04 | 5.0 ± 0.05 |
| Location of front teats Ustawienie przednich strzyków | 5.2 ±0.13 | 5.4 ± 0.09 | 5.0 ±0.12 | 5.1 ±0.11 |
| Location of rear teats Ustawienie tylnych strzyków | 5.2 ±0.09 | 5.1 ±0.08 | 5.0 ±0.10 | 5.0 ±0.12 |
| Length of teats Długość strzyków | 5.2 ±0.10 | 5.0 ±0.10 | 5.0 ±0.10 | 5.5 ±0.13 |

Tabela 1. Liniowy opis poszczególnych cech eksterieru jałówek

system was used. Characteristics of the pelvic part of rump angle and rear rump width in connection with linear descriptions were the following: visual assessment of rear angle was established as optimal (5 points) in the daughters of group I and group II bulls, while descendants of groups III and IV tended to have a sloping pelvis.

According to external appearance assessment results according to 100-point scale, udder-related characteristics have the highest percentage (40%).

104

A comprehensive assessment of characteristics of the dairy type (physiological ability of animals to provide high milk yields) was by two points higher for the descendants of Derby bull than for those of Pilgrim and Softwar bulls. Sheriff bull descendants had the lowest points for this characteristic (78). As far as body characteristics are concerned, the descendants of Softwar bull won the greatest number of points (87) leaving behind those of Pilgrim, Derby and Sheriff bulls by 7, 2 and 10 points respectively. In terms of body characteristics, the descendants of Pilgrim bull won the highest amount of points. The most developed udder was discovered in the descendants of Pilgrim and Derby bulls (78 points).

A rump width value of 6.5 points was given to the daughters of Derby bull (group II), which is more than the average rating. In this assessment they were significantly ($P \le 0.001$) surpassed by cows from other groups. Correct set of legs is of utmost importance in the external appearance of cattle. The results of assessment of legs are: rear leg angle has the optimum value for animals in all groups. Rear legs view is also estimated as average. Hoof angle is close to average in cows of all groups. The development of mammary system and fore udder attachment is estimated as average acceptable in the daughters of bulls of all groups. For rear udder attachment the highest score was given to the animals of group II; the scores of 0.5, 0.9 and 0.8 were given to cows of groups I, III and IV respectively ($P \le 0.001$). Central ligament and depth of udder are well expressed in animals of all groups. Front and rear teats are placed correctly in the middle of udder quarters and have an optimum length (6 cm).

Assessment of external appearance of cows, in particular linear assessment of animals by breed, is widely used in many countries of the world. Canada is one of the pioneer countries, whose breeders use only linear assessment in their work. The assessment of dairy cattle is carried out using the comparative method, according to which animals are judged based on their identity ("model" dairy standards). After obtaining the results of linear assessment, the selection of mothers of bulls is held according to descendants' conformation type and selection "as required" to obtain the aforesaid bulls.

In the United States of America, Canada, Germany and other European countries linear assessment is also given in catalogues of assessed bulls according to assessment results of the milking capacity of descendants [Bashenko et al. 1999]. According to International Standard requirements, breeding linear assessment of animals by type can be widely used for both dairy and combination breeds. In particular, breeding linear assessment has been carried out for such breeds as Ukrainian Red-Motley, Red and Black-Motley dairy and Simmental. Khmelnychyi [2005] and Admina [2009] have investigated the linear assessment of Black-Motley cattle in central regions of Ukraine. Results obtained by these authors prove the need to carry out selection based on external characteristics to be used both in selection by genotype and breeding stock and to preserve reproductive bulls in the head of Ukraine.

Assessment of cattle based on trueness to type is an important tool in breeding, which provides information on animal's body structure and production capacity as well as allows identifying those characteristics that are important from the economic point of view [Choroszy et al. 2010]. According to the ICAR definition, conformation linear assessment is partly determined by economic value of the animal, and, if these characteristics are inherited, partly by their genetic value as well. Data on conformation characteristics are used to assess the breeding value of dairy breeds [Dymnicki and Reklewski 1999, Hmelnichiy 2002, Czaplicka et al. 2003, Czerniawska-Piątkowska and Szewczuk 2006].

Sometimes a Ukrainian bull with a particular positively assessed conformation characteristic receives negative valuation after its value is converted to the genetic database of Poland or the USA. This is due to a large difference between average values of conformation-related characteristics that are used to describe cattle populations in different countries. Selection indexes are used in every country involved in dairy cattle breeding and present the total of all economically relevant characteristics adjusted to natural and economic conditions. Therefore, these indexes vary from country to country. All indexes in the world are continuously changing. Most countries used only production indexes 20 years ago, and only later were conformation and functional characteristics gradually introduced [Dymnicki and Reklewski 1999].

CONCLUSIONS

Therefore, the results of linear assessment of Black-Motley cows showed body conformation differences among cattle of dairy type, which points to the necessity of further selective breeding to improve its external appearance.

REFERENCES

- Admina, N.G. (2009). Influence of reproductive bulls on the exterior of the descendants Naukoviy visnik "Askania-Nova", 4, 36–41 [in Ukrainian].
- Bashenko, M.G., Tyshenko, I.V., Hmelnichy, L.M. (1999). Informatical-quantative system a basis of large-score breeding. Agric. Stud., 75 [in Ukrainian].
- Choroszy, Z., Choroszy, B., Grodzki, G., Stachyra, M., Szewczyk, A. (2010). Metoda oceny pokroju bydła mięsnego w Polsce [A new method for evaluation of beef cattle conformation in Poland]. Rocz. Nauk. Zootech., 37(1), 3–12 [in Polish].
- Cue, R.I., Harris, B.L., Rendel, J.M. (1996). Genetic parameters for traits other than production in purebred and crossbred New Zealand dairy cattle. Livest. Prod. Sci., 45, 123–135.

- Czaplicka, M., Puchajda, Z., Szalunas, T. (2003). Porównanie długości laktacji, okresu międzywycieleniowego oraz wydajności mleka w czterech laktacjach krów importowanych z Francji i krajowych c.b. [Comparison of the length of lactation, the intercalving period and milk yield during four lactations of cows imported from France and domestic Black-and-White ones]. Zesz. Nauk. Prz. Hod., 68(1), 107–114 [in Polish].
- Czerniawska-Piątkowska, E., Szewczuk, M. (2006). Kształtowanie się cech użytkowości mlecznej krów pierwiastek krajowych oraz importowanych z Danii i Holandii [Comparison of milk yield and composition as well as age at first calving between home-bred heifer cows and those imported from Holland and Denmark]. Acta Sci. Pol., Zootechnica, 5(2), 13–18 [in Polish].
- Dymnicki, E., Reklewski, Z., (1999). Użytkowość mleczna córek buhajów z niektórych krajów europejskich i krów importowanych z Niemiec i Holandii [Milk performance of doughters of top bulls from some countries and imported cows from Germany and Holland]. Zesz. Nauk. Prz. Hod., 44, 101–108 [in Polish].
- Goncharenko, I.B. (2006). Eksteryer u systemi selektsiyiyi molochnoyi khudoby. Naukovyy visnyk Lvivskoyi natsionalnoyi akademiyi veterynarnoyi medytsyny, 2(3), 55–64 [in Ukrainian].
- Hmelnichiy, L.M. (2002). Produktyvnist ta osoblyvosti eksteryeru koriv vysokoproduktyvnoho stada ukrayinskoyi chorno-ryaboyi molochnoyi porody. Tvarynnytstvo Ukrayiny, 3, 14–16 [in Ukrainian].
- Hmelnichiy, L.M. (2005). Assessment of the exterior of animals in the selection system of cattle. Dissertation of Doctor of PhD, spec. 06.02.01 – breeding and selection of animals, Chubynske, 2005, 40 [in Ukrainian].
- Kruszyński, W., Pawlina, E., Wierzbicki, H. (2006). Zależności między oceną pokroju krów pierwiastek rasy czarno-białej i czerwono-białej a ich użytkowością mleczną [Relations between conformation scores and milk performance in primiparous cows of black-white and red-white breeds]. Acta Sci. Pol., Zootechnica, 5(2), 47–56 [in Polish].
- Liskun, Û.F. (1950). Eksteryer silskohospodarskykh tvaryn. Derzhsilhopvydav URSR, pp. 251 [in Ukrainian].
- Mrode, R.A., Swanson, G.J.T., Lindberg, C.M. (2000). Genetic correlations of somatic cell count and conformation traits with herd life in dairy breeds, with an application to national genetic evaluations for herd life in the United Kingdom. Livest. Prod. Sci., 65, 119–130.
- Plokhinskiy, N.A. (1969). The biometrics guide for livestock specialists. Moscow, p. 256 [in Russian].
- Prydorohin, M.I., Liskun, Û.F. (1951). Eksteryer. Otsinka silskohospodarskykh tvaryn za zovnishnim ohlyadom. Derzhsilhospvydav URSR, pp.184 [in Ukrainian]
- Vukašinović, N., Moll, J., Künzi, N. (1995). Genetic relationships among longevity, milk production and type traits in Swiss Brown cattle. Livest. Prod. Sci., 41, 11–18.
- Instruction of classification (evaluation) of dairy cows and dairy and beef breeds by type (project). Institute for Animal Breeding and Genetics. [centuries], (2012), pp. 22 [in Ukrainian].

OCENA POKROJU KRÓW RASY BLACK-MOTLEY

Streszczenie. Badanie przeprowadzone w okręgu lwowskim miało na celu ocenę pokroju jałówek poszczególnych typów populacji zachodniej z wykorzystaniem klucza oznaczeń [Instrukcja oceny... 2012] wg dwóch systemów: liniowego opisu poszczególnych cech eksterieru (skala 9-cio punktowa) oraz kompleksowego oszacowania cech wg 100-punktowej skali. Badania przeprowadzone na bydle rasy black-motley wykazały rozbieżności w zewnętrznym wyglądzie ciała w zależności od typu mlecznego zwierzęcia, co wskazuje na zasadność prowadzenia procesu hodowlanego u tej rasy w kierunku poprawy eksterieru.

Słowa kluczowe: bydło, jałówki, Ukraina, rasa black-motley, eksterier

Accepted for print: 20.07.2015

For citation: Kohut, M. (2015). Assessment of external appearance of Black-Motley cows. Acta Sci. Pol. Zootechnica, 14(4), 101–108.