Connection Between Body Composition and Milk Production of Lacaune Sheep

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SUMMARY

Five, non-related, female and male progeny groups of rams were qualified in their body composition and milk production characteristics. Body composition characteristics (fat tissue, muscle tissue and water dense substances) were examined on 38 rams-to-be in 38-48 live weight with CT. Milk production data were collected from the half-sisters (n=106).

According to our judgement the influence of rams can be proven statistically in both production characteristics. As we have found close (in order: r = -0,786 and r = -0,721; P<0,05) connection between daily milk production and the areas of muscle tissue and water dense substances of the carcass measured by CT, we suggest taking the correlation between them into consideration in the selection of milk production. To get a precise prediction equation, further examinations are needed.

KEY WORDS

Lacaune sheep, progeny of rams, body composition, milk production, correlation, CT

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INTRODUCTION

The Lacaune, which has been registered since 1847, is kept in the biggest number in France (1,3 million ewes) and probably it is the best-known dairy breed. Its popularity is due to the deservedly world famous Roquefort cheese that represents a unique flavour and is made solely from the milk of this breed. Its milk production in stock-breeding is about 350 litres during a 150-day lactation period.

Its milk and meat productivity meet favourably. Its utilisation makes the creation of intensive milk-meat stocks possible, and it could have an important role in the formation of maternal line. Using in dairy constructions it is suitable for improving the marketability of the progeny, without decreasing milk production (www.majusz.hu).

The results of former CT examinations (Skjervold et al., 1981; Pászthy et al, 1991; Vangen, 1982; Parrat and Sim, 1987; Jopson et al, 1997) prove that the examinations of own performance as a part of purification can be made more efficient and precise with the X-ray diagnostic process.

In the Hungarian dairy sheep progeny testing meat production is not taken into consideration. In this research correlation between body composition and milk production were investigated. Examinations in connection with the body composition of the Lacaune breed with Computer Tomography (CT) have not been carried out, yet.

The goal of this research:

- examine the influence of the rams in their male – in CT-measured body composition – and female – in milk production – progeny groups,
- find connection between body composition and milk production in order that in following experiment find correlation breaker animals which could be the basic of a breed with reqiured meat and milk production.

MATERIAL AND METHODS

Meat production were examined on non-related progeny groups of rams (altogether 38 rams-to-be) and the milk production were examined on their half-sisters (altogether 106 dairy ewes) from the Pharmagene-Farm Ltd. of Mosonmagyaróvár. The live weight of rams examined with CT was 43±5kg.

The measurement of meat production was accomplished in the Diagnostic and Oncoradiology Institute of Kaposvár University using (spiral) HRCT method based upon serial exposures device by observing the CT examination protocol and animal hygienic regulations (12-24 hours starvation of animals, weighing, sedation, fixation, imaging, relaxation before transportation). This HRCT provides that the data are not recorded on determined anatomical points but images were taken of all over the body in normal mode with 10 mm slice thickness and 20 mm step. Depending on live weight, 65-70 images could be taken of an animal weighing 40-45 kg from the first cervical vertebra to the hock.

The archive images were processed by the so-called CTPC postprocessor. The demarcated area and its tissue division were recorded (we summarised the area values of all images in cm^2) according to the density measures of table 1.

The milk production datas were measured and collected at the Biotechnology Station of Mosonmagyaróvár of Pharmagene-Farm Ltd.

Analyses were performed with the help of SPSS® for Windows™ programme set. To compare the five groups, a variance analysis of variable (one way ANOVA, by LSD test) was used after the homogenity examination of data variance. The connections (correlation and regression) between data of milk production and CT examinations was examined. The statistic tests were carried out at $P \leq 0.05$ level.

RESULTS AND DISCUSSION

The progeny of the ram 78501 (ear number) had a significantly higher fat area in their carcass than the progeny of rams 13138 and 8517 which had the two lowest values. The same significant difference can be found between the progeny groups of rams 13112 and 13138, which had the second and fifth highest fat area (figure 1 and table 2).

Only the progeny of rams 13112 and 13138 differed significantly from each other in the muscle area of the carcass (figure 2 and table 3). Among the other groups there cannot be found statistically provable deviation, only an order can be set.

Progeny groups of rams 13112 and 78501 have significantly higher area of water dense substances

Table 1. Hounsfield variables relating to certain tissues

Values relating to different tissue types	Hounsfield variables
Fatty tissue	-200 - -20
Water dense substances	-20 - 20
Muscle tissue	20 - 200
Bony tissue	200 - 1500

Table 2. Descriptives of fat tissue of carcass (cm^2)

Progeny groups of rams	N	Mean	Std. Deviation
8517	13	2486,46	627,29
13112	5	2987,30	999,85
13125	7	2557,44	537,16
13138	8	1963,17	612,70
78501	5	3226,69	411,31
Total	38	2552,67	731,71

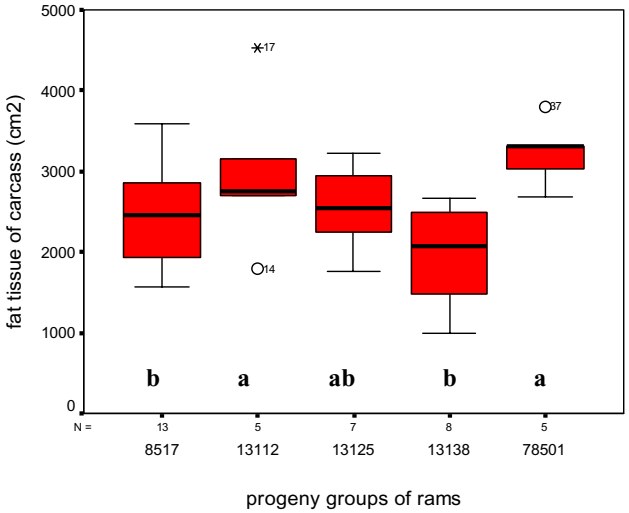

Figure 1. Area of fat tissue of carcass of progeny groups of rams; a,b = Means with different suprescripts differ significantly (P≤0,05)

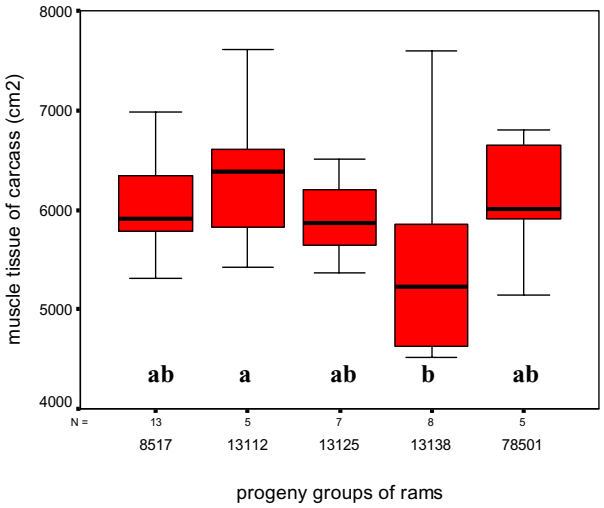

Figure 2. Area of muscle tissue of carcass of progeny groups of rams; a,b = Means with different suprescripts differ significantly (P≤0,05)

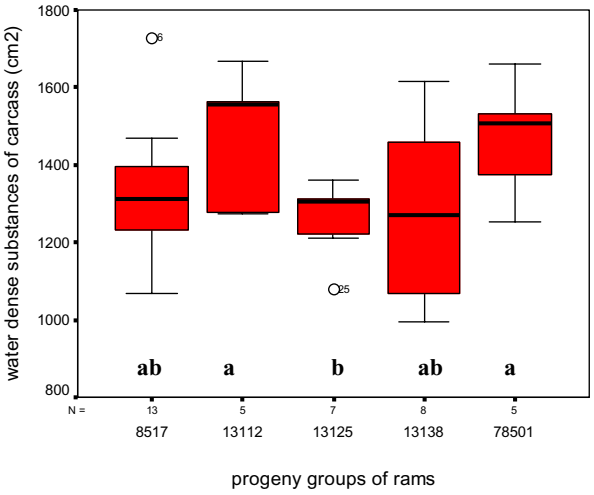

Figure 3. Area of water dense substances of carcass of progeny groups of rams; a,b = Means with different suprescripts differ significantly (P≤0,05)

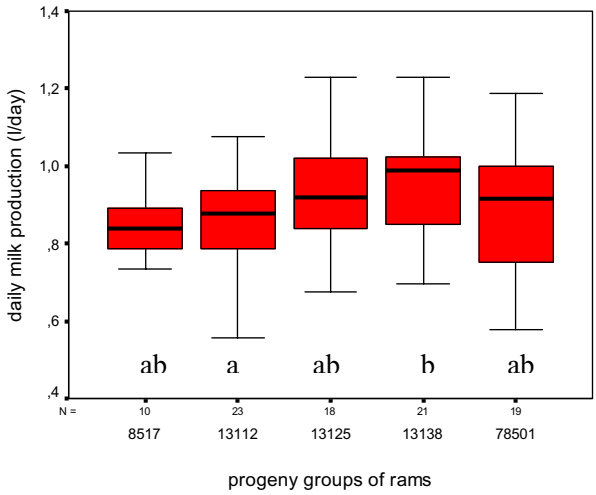

Figure 4. Daily milk production of progeny groups of rams; a,b = Means with different suprescripts differ significantly (P≤0,05)

Table 3. Descriptives of muscle tissue of carcass (cm^2)

Progeny groups of rams	N	Mean	Std. Deviation
8517	13	6004,20	463,44
13112	5	6369,97	838,88
13125	7	5919,82	405,05
13138	8	5440,54	1032,84
78501	5	6102,68	660,64
Total	38	5931,07	710,83

Table 4. Descriptives of water dense substances of carcass (cm^2)

Progeny groups of rams	N	Mean	Std. Deviation
8517	13	1319,78	166,44
13112	5	1468,67	180,85
13125	7	1258,89	94,13
13138	8	1275,40	233,41
78501	5	1464,75	156,47
Total	38	1337,89	183,13

than the progeny group of ram 13125 (figure 3 and table 4).

The milk production of progeny of rams 13138 and 13112 differed significantly from each other (figure 4 and table 5).

We searched for connection between milk production data and certain characteristics of body tissue composition. The mean values of data by progeny groups of rams were used. Close connection was not found between the fat tissue area of the carcass and daily milk production. On the other hand an equation

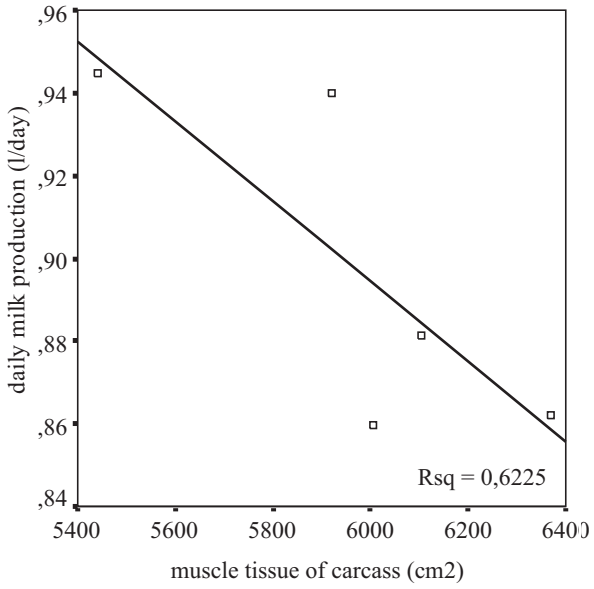

Figure 5. Correlation between muscle tissue of carcass and daily milk production

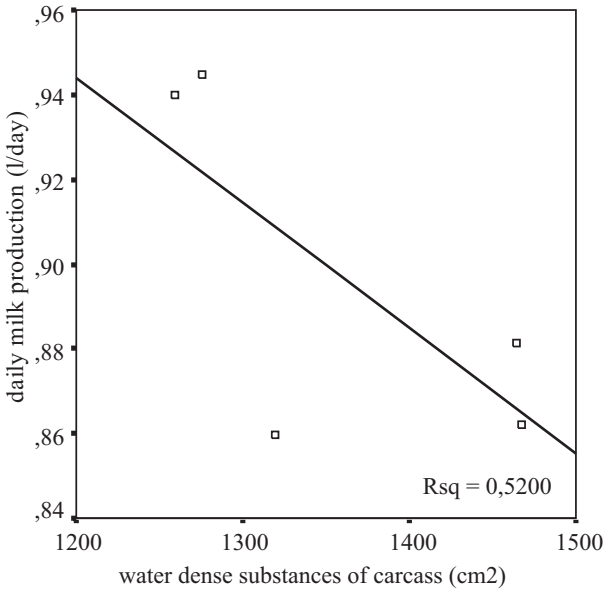

Figure 6. Correlation between water dense substances of carcass and daily milk production

Table 5. Descriptives of daily milk production (l/day))

Progeny groups of rams	N	Mean	Std. Deviation
8517	12	0,86	0,08
13112	26	0,86	0,12
13125	20	0,94	0,14
13138	23	0,94	0,14
78501	19	0,88	0,16
Total	100	0,90	0,14

could be registered with high r^2 value between daily milk production and muscle tissue and water dense substances (62,25% and 52%, respectively).

A close negative correlation (r = -0,789, P<0,05) can be found between the muscle area of the carcass of the progeny groups of rams (examined in 43±5kg live weight) and the daily milk production of their half-sisters (figure 5).

A close negative correlation (r = -0,721, P<0,05) could also be found between the area of water dense substances of the carcass and daily milk production (figure 6).

CONCLUSIONS

Rather few significant difference were found between the groups, that means the examined stock in meat production is homogeneous. But to sum the differences, the ram lambs of ram 13112 and 78501 prospectively deposed more muscle and connective tissues (water dense substances) - and deposed fat into that place later - than the progeny of other rams, while the progeny group of ram 13138 lagged behind the others both in fat and muscle deposition. The progeny groups of rams 13138 and 13112 produced a significantly different amount of daily milk.

A negative close correlation were found between the certain characteristics of body composition and milk production (between daily milk production and the muscle area of the carcass r = -0,789, and between daily milk production and the water dense substances of the carcass r = -0,721). That is the reason why it shall be taken into consideration in the selection for milk production. If the stock has a suitably high genetic variance, we shall strive for giving distinguished role to the correlation breaker animals in the selection. This way, with a bigger selection for milk production, could be achieved that meat productivity of progeny would not get worse, but it could even improve.

As these results are only relevant to the animals of this certain stock and only to the animals with 43±5kg live weight, further examinations are needed to make them widely applicable.

REFERENCES

Jopson N. B., McEwan J. C., Fennessy P. F., Dodds K. G., Nicoll G. B., Wade C. M. (1997): Economic benefits of including computed tomography measurements in a large terminal sire breeding programme. Association for the Advancement of Animal Breeding and Genetics. Proceeding of the 12th Conference. Dubbo. NSW, Australia. 6.-10. April 1997. 72-76.

Parrat A. C., Simm G. (1987): Selection indices for terminal sires to improve lean meat production from sheep in the United Kingdom. Animal Production 45. 1.: 87-96.

Pászthy Gy., Lengyel A., Horn P. (1991): Comparing breeds and fattening methods by computer tomography in live sheep. 42nd Ann Meet. EAAP., Berlin, 255-266.

Skjervold H., Grønseth K., Vangen O., Evense A. (1981): In vivo estimation of body compositoin by computerized tomography. Z. Tierzüchtg. Züchtgsbiol. 98: 77-79.

Vangen O. (1992): Assesing body composition of pigs by computer assistad tomography. Review. Pigs News and Information. Vol. 13. No. 4. 1-22.

www.majusz.hu/aloldalak/02tenyesztesiprogram/fajta/16lacaune.htm

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