



*Original Contribution*

## COMPARATIVE STUDY ON FATTENING AND MEAT QUALITY OF FINE WOOL AND CROSSBRED LAMBS

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### ABSTRACT

Experiment was carried out to characterize fattening and meat quality of lambs from two fine wool breeds - Caucasian, and North Caucasian, and one crossbred breed - South Bulgarian Corriedale. The results from the research showed that over a 60-day intensive fattening period the average daily gain was 205g for the North Caucasian and 220g for lambs of the South Bulgarian Corriedale breed. The average daily gain of lambs of the South Bulgarian Corriedale breed was higher than that of the Caucasian by about 5% and that of the North Caucasian by 6.8%. Consumption of net energy (feed units) per kilogram gain for South Bulgarian Corriedale lambs was 7.4% lower than that for the North Caucasian and 3.2% lower than that of the Caucasian breed. Lambs of the South Bulgarian Corriedale breed showed the best meat production traits and protein contents in the meat.

**Key words:** Body Weight, Average Daily Gain, Feed Conversion Ratio, Meat Yield Traits, Meat Chemical Composition

### INTRODUCTION

Studies on the fattening and meat-yielding qualities of fine-fleeced sheep, fattened intensively in Bulgaria, have been made by a number of authors (1, 2, 3, 4). Comparative fattening and meat-yielding qualities of sheep of the Caucasian breed have been studied too (5). The Caucasian breed is mostly used for crossing with other breeds to create fine-fleeced and semi fine-fleeced sheep, including crossbred types in Bulgaria. Similar comparative studies have also been carried out on the fattening and meat-yielding qualities of sheep of the North Caucasian breed (5, 6). Research on the fattening qualities of crossbred sheep with North Caucasian mothers, has been accomplished, especially in the area of cross-breeding (5, 6, 7, 8). Few studies have, however, been done on breeding between the South Bulgarian Corriedale with the tribal flock of the town of Kazanlak (9). Such a study has not been done at the Complex Agricultural Experimental Station – Yambol.

The objective of this research was to establish any differences in the fattening, slaughtering and meat-yielding indicators among lambs of the Caucasian, North Caucasian and South Bulgarian Corriedale breed.

### MATERIALS AND METHODS

The experiment with three groups of male lambs was carried out at the Complex Agricultural Experimental Station – Yambol. Group 1 comprised 16 lambs of the Caucasian breed. Group 2 was made up of 17 lambs of the North Caucasian breed and Group 3 consisted of 16 lambs of the South Bulgarian Corriedale breed. The lambs were weaned 45 days after birth. They were either from single or twin births. The fattening took an intense process over a period of 60 days. The animals were fed *ad libitum* with mixture concentrates and lucerne hay. The mixture concentrate was 1.12 feed-units (Russian oats units equal to 1425 kcal net energy according to Kellner) and 116 g digestible protein per kilogram. The feed consumption was controlled every day and results recorded.

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A slaughtering analysis was made on four lambs from each group after the 60-day fattening period. In order to find the chemical composition of the meat from each slaughtered

lamb, mixed samples of the meat, in proportion to the weight of every part of the carcass, were made.

All data were processed statistically.

**Table 1:** Body weight, average daily gain and feed conversion ratio

| Traits                                    | Caucasian<br>n = 16 |       | North Caucasian<br>n = 17 |       | South Bulgarian<br>Corriedale<br>n = 16 |       |
|-------------------------------------------|---------------------|-------|---------------------------|-------|-----------------------------------------|-------|
|                                           | X ± Sx              | C     | X ± Sx                    | C     | X ± Sx                                  | C     |
| Live weight in the beginning of trial, kg | 17.29 ± 0.20        | 4,58  | 16,98 ± 0, 23             | 5.42  | 16,81 ± 0,24                            | 7,71  |
| Live weight in the end of trial, kg       | 29, 84 ± 0,73       | 9,76  | 29,29 ± 0,41              | 5,70  | 30,00 ± 0,62                            | 8,32  |
| Weight gain, kg                           | 12,55 ± 0,45        | 14,17 | 12,31 ± 0,45              | 10,63 | 13,19 ± 0,28                            | 8,545 |
| Average daily weight gain, g              | 209 ± 7,42          | 14,20 | 205 ± 5,31                | 10,64 | 220 ± 4,70                              | 8,19  |
| Feed units* per 1 kg gain                 | 4.17                |       | 4.32                      |       | 4.00                                    |       |
| Digestible protein per 1 kg gain, g       | 521                 |       | 538                       |       | 449                                     |       |

\* Feed unit is equal to 1425 kcal net energy according to Kellner method

## RESULTS AND DISCUSSION

The differences in the live weight at start of the experiment were not significant ( $p > 0,05$ ). This showed that growth of lambs during suckling period was the same in all three breeds. After the 60-day fattening period we could not find any significant differences in live weight and average daily gain among the groups.

**Table 2** shows that South Bulgarian Corriedale lambs had better slaughtering and meat-yielding qualities than the other two groups. The weight of the cooled carcass of the South Bulgarian Corriedale lambs was higher than that of the North Caucasian breed by approximately 5%, and by 6.2% over the Caucasian breed. The dressing percentage was higher in this order, 5.8% and 6.7%, respectively.

**Table 2** Slaughtering and meat yield traits

| Traits                           | Caucasian<br>n = 4 |        | North Caucasian<br>n = 4 |        | South Bulgarian<br>Corriedale<br>n = 4 |        |
|----------------------------------|--------------------|--------|--------------------------|--------|----------------------------------------|--------|
|                                  | X ± Sx             | %      | X ± Sx                   | %      | X ± Sx                                 | %      |
| Weight before slaughtering, kg   | 29,27 ± 0,71       | 100,00 | 29,15 ± 1,09             | 100,00 | 30,05 ± 0,61                           | 100,00 |
| Weight of cooled carcass, kg     | 13,52 ± 0,41       | 46,19  | 13,71 ± 0,37             | 47,03  | 14,42 ± 0,31                           | 47,98  |
| Weight of internal organs, kg    | 1,67 ± 0,10        | 5,71   | 1,51 ± 0,06              | 5,18   | 1,58 ± 0,06                            | 5,26   |
| Weight of internal fat, kg       | 0,38 ± 0,05        | 1,30   | 0,32 ± 0,05              | 1,10   | 0,48 ± 0,11                            | 1,60   |
| Slaughtering yield, kg           | 13,90 ± 0,35       | 47,49  | 14,04 ± 0,31             | 48,16  | 14,90 ± 0,34                           | 49,58  |
| Weight of half carcass, kg       | 5,75 ± 0,18        | 100,00 | 6,29 ± 0,21              | 100,00 | 6,57 ± 0,19                            | 100,00 |
| Meat of half carcass, kg         | 4,12 ± 0,17        | 71,65  | 4,60 ± 0,17              | 73,13  | 4,86 ± 0,16                            | 73,97  |
| Bones of half carcass, kg        | 1,63 ± 0,04        | 28,35  | 1,69 ± 0,06              | 26,87  | 1,71 ± 0,09                            | 26,03  |
| Thickness of fat, mm:            | 6                  | -      | 60,00 ± 10,80            | -      | 65,00 ± 5,00                           | -      |
| ⇒ at breast – bone               | 0,00 ± 12,25       | -      | 60,00 ± 5,77             | -      | 57,5 ± 8,54                            | -      |
| ⇒ at root of tail                | 40,00 ± 5,77       | -      | 22,50 ± 2,50             | -      | 37,50 ± 2,50                           | -      |
| ⇒ at 12 – rib                    | 30,00 ± 5,77       | -      |                          |        |                                        |        |
| Muscle eye area, cm <sup>2</sup> | 13,55 ± 0,17       | -      | 13,68 ± 0,23             | -      | 13,93 ± 0,21                           | -      |

The meat-bones ratio in the South Bulgarian Corriedale lambs was significantly

higher ( $p < 0,05$ ) compared to those of the other two. South Bulgarian Corriedale lambs had the

largest eye muscle area of /13.93 cm<sup>2</sup>/, followed by North Caucasian lambs /13.68/, with the Caucasian lambs having the least. The three breeds produced a dressing percentage of less than 50%. The eye muscle area was less than 15 cm<sup>2</sup> and the meat mass was less than 78% of carcass weight. This showed that the breeds raised at the Complex Agricultural Experimental Station, Yambol, did not meet the requirements for a meat-wool-yielding type of sheep. A better selection is therefore necessary, especially in the case of the South Bulgarian Corriedale breed, with a view to creating the

desired meat-wool-yielding type of sheep that will improve the meat yield.

The dry matter content of the mutton was highest in Caucasian lambs peaking at 28.47%, (**Table 3**). This could be explained by the recognition of higher content of fats in the meat (10.13%), whereas South Bulgarian Corriedale lambs had 8.33% fats, and the North Caucasian having 8.15%. The highest protein contents were found in the South Bulgarian Corriedale lambs (17.22%), compared to the North Caucasian that had the lowest. The differences in this parameter among the groups were small and not significant ( $p > 0,05$ ).

**Table 3:** Chemical composition of whole carcass meat, %

| Traits     | Caucasian<br>n = 4 |       | North Caucasian<br>n = 4 |       | South Bulgarian<br>Corriedale<br>n = 4 |       |
|------------|--------------------|-------|--------------------------|-------|----------------------------------------|-------|
|            | X ± Sx             | C     | X ± Sx                   | C     | X ± Sx                                 | C     |
| Dry matter | 28,47 ± 0,73       | 9,76  | 26,92 ± 0,75             | 5,57  | 26,63 ± 1,03                           | 7,72  |
| Water      | 71,53 ± 1,34       | 3,74  | 73,08 ± 0,75             | 2,05  | 73,37 ± 0,99                           | 2,71  |
| Protein    | 17,03 ± 0,56       | 6,62  | 16,24 ± 0,22             | 2,70  | 17,22 ± 0,43                           | 5,05  |
| Fat        | 10,13 ± 1,13       | 22,36 | 8,15 ± 1,06              | 26,07 | 8,33 ± 0,90                            | 21,72 |
| Ash        | 1,12 ± 0,06        | 11,36 | 1,00 ± 0,02              | 3,85  | 1,03 ± 0,03                            | 5,23  |

## CONCLUSIONS

The South Bulgarian Corriedale breed had the highest average daily growth, exceeding the Caucasian breed by approximately 5% and the North Caucasian by 6.8%.

The conversion of net energy (feed-units) in the South Bulgarian Corriedale lambs was 7.4% lower than that in the North Caucasian, and 3.2% lower than that in the Caucasian breed.

Slaughtering quality and meat-yielding indicators of lambs from all studied breeds produced lower values compared to the usual values in sheep-breeding practice of meat and wool-yielding breeds of sheep. So we recommend a future selection process that should be directed at their improvement.

## REFERENCES

1. Boykovski, S., I. Grigorov, S. Nakev, A. Stoyanov and P. Marinova, Research on the fattening qualities of lambs fattened till reaching various pre-slaughtering weight. I. Of the Northeastern Bulgarian thin-fleeced breed – Shumen type. *Journal of Animal Science* (BG), 4: 35-36, 1982.
2. Nakev, S., A. Stoyanov and S. Boykovski, Research on the meat-yielding qualities of sheep, originating from the major lines of Shumen type of the North Caucasian Bulgarian thin-fleeced breed. *Journal of Animal Science* (BG), 3: 39-34, 1980.
3. Boykovski, S., Meat output of early weaned sheep of the Askanian breed, fattened till reaching various live weight. *Journal of Animal Science* (BG), 4: 3-9, 1983.
4. Raychev, S., I. Ivanov and Ya. Georgieva, Comparative research on the meat-yielding indicators of lambs, slaughtered with different pre-slaughtering weight. *Journal of Animal Science* (BG), 5-8: 172-177, 1992
5. Raychev, S., I. Stankov, M. Petev and S. Stoychev, Research on the fattening and meat-yielding qualities of the pure-breed Caucasian lambs and interbreedings of the cross-bred type. Scientific works from an anniversary scientific session – 25 years COS – Yambol, (BG), pp 518-525, 1989.
6. Stankov, I., Dissertation, (BG), Sofia, 1986.
7. Raychev, S., Ya. Kazharov, and I. Stankov, Research on the fattening and meat-yielding qualities of thin-fleeced, semi-thin-fleeced and rough-fleeced lambs. *Journal of Animal Science* (BG), 2: 34-39, 1984.

8. Dimitrov, I. and I. Ivanov, Fattening and meat-yielding qualities of sheep of the Thracian thin-fleeced breed, Stara Zagora type and its three-breed crossings. *Journal of Animal Science* (BG), 5: 23-33, 1984.
9. Ivanova,, I. and I. Dimitrov, Comparative research on the amount and quality indicators of lamb meat of the South coridel and Il de France breeds. *Journal of Animal Science* (BG), 5-8: 157-161, 1992.