# Dynamics of the morphological structure of carcass in sheep

**A.L. Yatsuyta[1], D.V. Nikitchenko[1] & V.E. Nikitchenko[2]**
[1]Meat processing plant "Mikoyanovskiy", 41 Talalikhina Str., 109316 Moscow, Russia,
E-mail: yatsuyta@mmkom.ru.
[2]Peoples Friendship University of Russia, 6 Miklukho-Maklaya Str., 117198 Moscow, Russia,
E-mail: rudn@rudn.ru.

**Abstract**

Carcass with a certain weight, category of fatness and with a known age of the slaughtered animal is one of the main parameters of the quality of meat. At an intensive feeding level sheep for meat and wool production up to 5,5-month's age can give lambs with a carcass weight of 15,5 kg, and by 7-month – a weight of up to 20,5 kg with a comprehensible morphological structure. With an increase in the weight of the carcass the muscular and bone tissues relatively decrease, and fatty tissues - increase. The intensive feeding level of sheep accelerates the growth rate of the muscular tissues and raises the growth of fatty tissues, low feeding level slows down growth in both muscular, and fatty tissues.

**Introduction**

The carcass is an extraordinary changeable product that contains edible (soft tissues) and uneatable parts (bones, fascia and lymph nodes). The edible parts differ greatly in quality, because of the different correlation of fat and muscular tissues in them.

A study of the dynamics of the morphological composition in the carcass of sheep was carried out with the increase of its mass in every five kg under different categories of fatness and age of the animals.

**Materials and methods**

The Studies conducted on carcasses of rams and wether of the meat and wool, wool and meat, meat and fur coat sorts and hybrid animal of different categories of fatness. The growing and fattening of rams were conducted on ration with an average daily planned increase of the live weight 170-185g (moderate fattening), 265-275g (intensive fattening) and 130-140g (low level fattening).

**Results and discussion**

**Table 1.** The Morphological composition of meat of the I category of fatness that were received from rams and wether under moderate growth and fatten

| Age (months) | Pre-slathered live weight in kg | Mass of carcass in kg | % from the mass of the carcass | | | |
|---|---|---|---|---|---|---|
| | | | Muscles | Fat | Other tissues | Bones |
| 3-4 | 16-27 | 7,5 (5-10) | 71,20 | 4,01 | 3,05 | 21,74 |
| 5-6 | 27,1-34 | 12,5 (10,1-15) | 70,18 | 6,49 | 3,02 | 20,31 |
| 7-8 | 34,1-43 | 17,5 (15,1-20) | 67,96 | 10,25 | 2,98 | 18,81 |
| 9-10 | 43,1-52 | 22,5 (20,1-25) | 64,57 | 15,20 | 2,91 | 17,32 |
| 11-12 | 52,1-60 | 27,5 (25,1-30) | 59,95 | 21,19 | 2,85 | 16,01 |
| 13-16 | 60,1-70 | 32,5 (30,1-35) | 53,51 | 29,03 | 2,79 | 14,67 |

It was established that on average, every two months the mass of the carcass increases by 5 kg, but the growth of tissues were different.

So from 3to 4 months old with a carcass mass of 7,5 kg in growth of the carcass by 5 kg, the amount of muscle tissues of the carcass amounts to 3,56 kg, fat - 0,2, bones -1,09, other tissues - 0,15 kg. From 7- 8 months old with a carcass mass of 17,5 kg the increase in muscle tissues amounts to 3,40 kg, fat - 0,51, bones - 0,94 kg; from 13 – 16 months old with a carcass mass of 32,5 kg - 2,68; 1,45 and 0,73 kg accordingly.

It was established that with an increase of the carcass mass by 5 kg, the growth mass of the muscle and bone tissues gradually decreases.

Therefore, from 4 -6 months old in small rams, the growth of muscle tissues decreases by 1.40%, bone - 6.43; from 6 – 8 months – 3.14 and 6.86%; from 8 -10 months by 5.00 and 7.45; from 10 – 12 months – 7.12 and 8.05; from 12 – 18 months – 10.67 and 8.75% respectively.

As to adipose tissues, with an increase in the mass of the carcass by every 5 kg (from 7.5 – 32.5 kg carcass) its relative mass increases by 2.48; 3.76; 4.95; 5.99 and 7.84% (by difference).

Under intensive growth and feeding of rams and wether, an increase occurs in the carcass weight in every 5 kg on an average in 1.5 months (Table 2).

With an increase in the carcass weight from 10.5 – 15.5 kg, the gain of muscle tissue amounts to 3.44 kg, bone tissue – 0.98 kg, adipose tissue – 0.44 and other tissues – 0.15 kg.

The gain of carcass weight from 15.5 – 20.5 kg, the portion of the muscle tissue increased by 3.25 kg, bone tissue -0.88 kg and adipose tissue – 0.73 kg.

The increase of carcass weight also by 5 kg (to 25.5 kg), the gain of muscle tissues became less than the previous 5 kg and equals 2.96 kg; bone tissue – 0.80 kg, but adipose tissue became more by 1.10 kg.

With the continuation of the intensive fattening of rams and receiving from them carcass with a weight of up to 30.5 kg with the gain of the last 5 kg, the portion of muscle tissues amounts to 2.62 kg; bone tissues amounts to 0.74 and adipose tissues 1.5 kg.

**Table 2.** The Morphological composition of meat of the I category of fatness that were received from rams and wether under intensive growth and fattening

| Age (months) | Pre-slathered live weight in kg | Mass of carcass in kg | % from the mass of the carcass | | | |
|---|---|---|---|---|---|---|
| | | | Muscles | Fat | Other tissues | Bones |
| 4 | 17-28 | 10,5 (8-13) | 70,81 | 4,68 | 2,98 | 21,53 |
| 5,5 | 28,1-37,5 | 15,5 (13,1-18) | 68,74 | 8,82 | 2,94 | 19,50 |
| 7 | 37,6-47 | 20,5 (18,1-23) | 64,91 | 14,58 | 2,90 | 17,61 |
| 8,5 | 47,1-56,5 | 25,5 (23,1-28) | 59,19 | 21,96 | 2,87 | 15,98 |
| 10 | 56,6-66,1 | 30,5 (28,1-33) | 52,48 | 30,03 | 2,78 | 14,71 |

On the whole, under intensive rearing and feeding of rams from 4 – 10 months of age and receiving from them carcass with a weight of 10.5 – 30.5 kg, the relative composition of the muscle tissue in the carcass decreased by 18.33%, bone tissue by 6.82%, but adipose tissue increased by 25.33% (by difference).

As is known, in facilities with a lack of feed, sheep are kept and fed on a low level ration. With that, an average daily growth live weight of 130 – 140 g and a second category carcass are received (Table 3).

**Table 3**

| Age (months) | Pre-slathered live weight in kg | Mass of carcass in kg | % from the mass of the carcass | | | |
|---|---|---|---|---|---|---|
| | | | Muscles | Fat | Other tissues | Bones |
| 4-6,5 | 18-31 | 9,5 (7-12) | 71,30 | 3,15 | 3,13 | 22,42 |
| 6,5-9 | 31-43 | 14,5 (12,1-17) | 70,98 | 4,21 | 3,08 | 21,73 |
| 9-12 | 43-54,8 | 19,5 (17,1-22) | 70,30 | 5,56 | 3,05 | 21,09 |
| 12-15 | 54,9-65,7 | 24,5 (22,1-27) | 69,45 | 7,06 | 2,97 | 20,52 |
| 15-18 | 65,8-76 | 29,5 (27,1-32) | 68,48 | 8,69 | 2,92 | 19,91 |

Under low levels of feeding, there is an increase in the carcass weight after every 3 months by 5 kg on average; carcass weighs 9.5 kg after 5.5 months of age.

Their morphological composition represents a large content of muscle tissue in contrast to carcasses which were received under intensive growth -7 1.30% against 70.81%; bone tissue – 22.42 against 21.53%, but with a smaller content of adipose tissue 3.15 against 4.68%.

With the analysis of the data in table 3, it is seen that with an increase in the carcass weight by every 5 kg, the gain in muscle and bone tissues gradually decreases, but adipose tissue increases.

Therefore, with an increase of the carcass weight from 9.5 – 14.5 kg, the gain in muscle tissue amounts to 3.55 kg, bone tissue 1.09 and adipose tissue 0.21 kg.

Hereinafter, with an increase of carcass weight of up to 29.5 kg on every 5 kg an average of 3.47 kg of muscle tissue and 1.03 kg of bone tissue are added.

The amount of adipose tissue on every 5 kg increases by 50 – 80 g. From here, the relative composition of muscle tissue with the increase of carcass weight increases from 71.30% with a carcass weight of 9.5 kg – 68.48% with the carcass weighing 29.5 kg.

The relative composition of bone tissue also decreases from 22.42 – 19.91% respectively. Only the amount of adipose tissue increased insignificantly from 3.15 – 8.69% respectively.

**Conclusions**

Carcass weight with a determined category of fatness and a known age at slaughter is one of the main quality factors of meat.

Under the intensive level of feeding of meat-wool sheep to 5.5 months of age, it is possible to get lambs with a carcass weight of 15.5 kg, to 7 months of age – a weight of up to 20.5 kg.

With the increase of carcass weight, the portion of muscle and bone tissues comparatively decrease, but adipose tissue increases.

The intensive level of feeding of sheep accelerates the growth velocity of muscle tissues and raises the growth of adipose tissues, low levels of feeding slow down the growth rate in muscle as well as adipose tissues.