

SHARE OF TISSUE IN COMMERCIAL HOG MEAT DEPENDING ON AGE AND SLAUGHTER WEIGHT

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ABSTRACT

Live weight in hogs increases steadily from birth to slaughter, in exchange average daily increase decreases, 180 days after birth, despite the fact that body weight increases. The share of tissues (muscle, adipose, and bony) in the body differs depending on age and slaughter weight. Muscle tissue deposits are maximal for a weight of 105.712 kg, then they diminish; adipose tissue depositing has a slower rhythm in young animals; then the share of deposits is maximal at the age of 210 days (25.18%). Bony tissue has a high share in young animals, with a lower growth rate compared to the general growth of the animals.

KEY WORDS

commercial hogs, tissues, growth, living weight, and share

1. INTRODUCTION

In swine, the growth process can be defined either globally, as the gain in living weight, or as the evolution of one of the features of body development: size, weight, tissue composition. Body weight evolution from farrowing to slaughter age is not constant, as in young animals there is a steady growth depending on age followed by a decrease in adults [1, 2]. From this point of view, there are 3 periods in swine's life in which the share of tissue of the growth rate is different:

- the 1st period, from birth to 180 days, is characterised by intense growth of muscle and bony tissue and a lower share of adipose tissue;
- the 2nd period, from 180 to 365 days, in which the shares of muscle and adipose tissue are about the same and that of the bony tissue is lower;
- the 3rd period, characterised by the fact that growth processes in muscle and bony tissues are almost finished and the share of adipose tissue is high (365-450 days).

The factors that influence meat quality in swine can be grouped in 2 categories, i.e.: factors responsible for the differences between animals (breed, sex, age, feeding), and factors responsible for the differences

between the muscles of the same animal (anatomical site, muscle physiology). These factors can also be grouped as follows: breeding factors, genetic factors, and transportation and slaughtering house factors. They consider 50% of the variations in pork quality can be explained by transportation and slaughtering house factors, while 40-45% are genetic and only 5% are breeding ones [2].

Breeding factors. Meat quality (less muscle tissue and more adipose tissue) can be influenced by certain conditions on the farm, i.e.: age, slaughtering weight, sex, feeding (balance between the main nutrients, vitamin supply, growth promoter administration), environmental temperature, and breeding system [1, 2]:

- Age influences meat quality in the sense that in all animal species there is an increase in colour intensity depending on age due to a higher haemoglobin percentage. Older slaughtering age diminishes meat tenderness not by a change in collagen, but by an increase of the degree of polymerisation of collagen and, therefore, a decrease of its solubility. Age influences chemical composition of the meat, piglets providing meat richer in water and proteins and poorer in fat compared to adult or old hogs [1, 2].
- Slaughtering weight influences the share of tissues in the body's structure, but a different weight upon slaughtering (from 80 to 130 kg, for the same age) does not influence organoleptic features meat technology. Un-castrated male meat has a lower fat content than that of females, and that of females has a lower fat content than that of castrated males.
- Feeding, be it restricted or at leisure, and the nature of raw matter (forage quality) influences a lot the share of tissues in the swine body structure. Restricting feed or protein-low diets result in changes of the fat percentage in the muscles and, therefore, in flavour and tenderness. Numerous studies [1, 2] were done in order to establish the influence of the type of raw matter used in the feeding of commercial hogs on tissue share in swine body structure and on organoleptic features of the meat. The origin and quality of raw matter used does not affect the quality of muscle tissue but influences the quality of adipose tissue. Variations of content in protein or amino acids (lysine, methionine) in dosages do not affect technological quality of meat, animal meat being more exudative and with higher losses upon cooking. There are also low values of tenderness and succulence [2].
- Temperature on farms influences energetic needs and growth performances in animals. A diminution of environmental temperature in swine, accompanied by food compensation, does not modify lipid continuity in white muscles, but leads to an increase in lipid content in red muscles [1, 2]. Temperature variation influences muscle metabolism: exposure to cold results in an increase of enzymatic oxidant activity in the muscles and the percentage of type I fibres in the red muscles, and increases glycolithic capacity of *Longissimus dorsi* muscle [1].

2. MATERIAL AND METHOD

The experiment was carried out on a 1000-head lot of piglets from birth to 210 days, offspring of the crossing between Hampshire boars and half-breed sows (Large White Landrace). We monitored average daily growth by weighting the animals over 30 days of age. Starting from 22.180 kg, we slaughtered 10 heads to determine the average muscle, fatty, and bony tissue share of the body weight structure. Tissue share of body weight structure was represented in percentages. After 210 days, there were no more measurements, the animals being all slaughtered.

3. RESULTS AND DISCUSSION

One can see that from birth to 180 days, body weight increases and average daily growth is progressive, while after this age there is a decrease in average daily growth despite the body weight decrease (Table 1 and Graph 1). Percentage evolution in muscle, fatty, and bony tissues differs depending on age and body weight, as shown in Table 2.

We can conclude that, as well as the average daily growth muscle tissue percentage has a proportional growth with animals' living weight between 22.180 and 105.712 kg. After that, there is a decrease in it depending on the weight at which it reaches its maximal level: this is why it is advisable to slaughter hogs only at this weight. Fatty tissue percentage has a different value depending on body weight, the maximum level being reached at 126.072 kg, when the percentage reaches 25.18%. But at this weight, fatty deposits are high compared to average daily growth, which decreases after 180 days. The share of bony tissue decreases with age, being lower than body weight evolution on the whole.

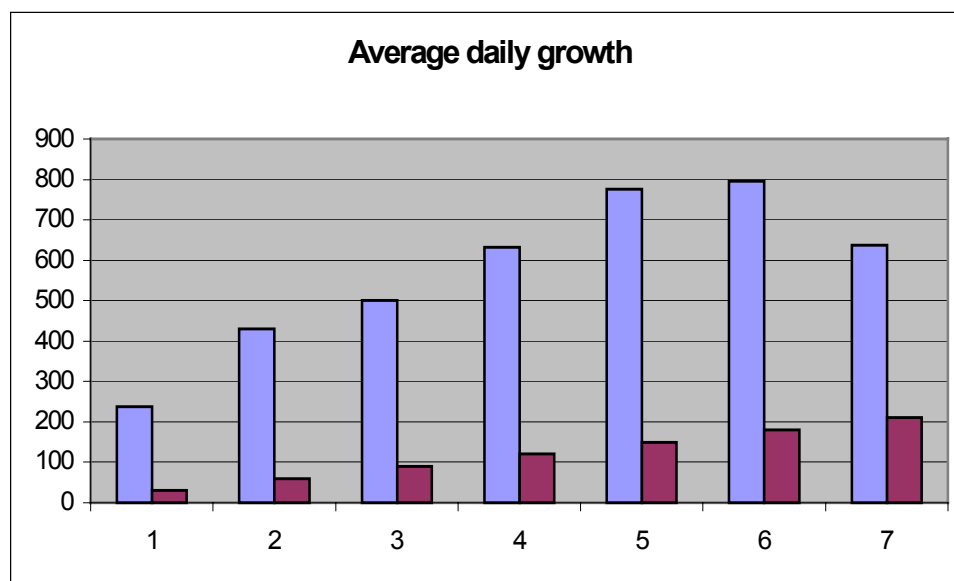
We can see that, with age and after having gained optimal slaughtering weight, muscle tissue deposit is more diminished, while fatty tissue deposits increase. Bony tissue share is between close limits. Thus, we can say that if we put together muscle tissue share and fatty tissue share and if we try to increase, by feeding, muscle tissue, its increase results in a decrease of fatty tissue share as bony tissue share variation is low.

TABLE 1. BODY WEIGHT AND AVERAGE DAILY GROWTH IN COMMERCIAL HOGS BETWEEN 0-210 DAYS OF AGE

Age (days)	Total weight of the lot (kg)	Number of heads	Average (x)	Total growth (kg)	Days of feeding	Average daily growth (g)
Birth	1,485	1000	1.485	-	-	-
30	8,403	943	8.911	6,918	29,160	237
60	20,428	921	22.180	12,025	27,960	430
90	34,117	911	37.450	13,689	27,330	501
120	51,187	900	56.874	17,070	27,000	632
150	71,858	888	80.921	20,671	26,640	776
180	92,815	878	105.712	20,957	26,340	795
210	109,430	868	126.072	16,615	26,040	638

TABLE 2. TISSUE PERCENTAGE DEPENDING ON LIVING WEIGHT IN COMMERCIAL HOGS

Living weight (kg)	Type of tissue		
	Muscle (%)	Fatty (%)	Bony (%)
22.180	49.45	20.16	12.34
37.450	52.14	23.34	11.82
56.874	54.23	3.83	10.20
80.921	57.19	24.08	9.48
105.712	58.28	24.46	9.03
126.072	57.45	25.18	9.96
x	54.79	23.50	10.30



GRAPH 1. EVOLUTION OF BODY WEIGHT DEPENDING ON ANIMAL'S AGE

4. CONCLUSION

Body weight increase goes with age, while average daily growth decreases after 180 days. Muscle tissue share is maximal at a weight of 105.712 kg, i.e. 58.28%, and then decreases, while fatty deposits share increases to 25.18%. Bony tissue has a great share in young animals with a lower growth speed compared to animals' weight growth.

5. REFERENCES

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