
**THE INFLUENCE OF TEMPERATURE FROM SHELTERS FOR THE
EXPLOITATION OF FATS PIGS ON THE THICKNESS OF THE FATS LAYER
TO SWINE**

**DEKANI ALEXANDRU TIBERIU¹, PANDURU ELISABETA BIANCA¹, HUZĂU GELU¹,
PETROMAN IOAN¹, PETROMAN CORNELIA*¹**

*¹Banat's University of Agricultural Sciences and Veterinary Medicine "King Michael I of
Romania" from Timisoara, Faculty of Management and Rural Tourism, Timisoara*

*Corresponding author's e-mail: c_petroman@yahoo.com

***Abstract:** The exploitation of fatty pigs in small professional farms, at low ambient temperatures, accumulates in carcasses high amounts of fat compared to animals operated for meat under ambient temperature conditions controlled according to physiological needs. The low temperature contributes to the inefficiency of feed conversion and mass conversion depositing more fat as a protection against cold with higher energy consumption. For a significance threshold of $p \leq 0.05$ the differences are significant between the thicknesses of the bacon layer from the lumbar region to the two categories of fatty pigs, these being distinctly significant for the same threshold regarding the thickness of the back fat layer when operating under different conditions of ambient temperature. Failure to ensure optimal ambient temperature during the fattening period determines physiological and behavioral changes in pigs by forming stereotypes and changing the group hierarchy with adverse effects on the productive indicators.*

Key words: *fatty pigs, temperature, fat accumulation in the carcass*

INTRODUCTION

Fatty pigs exploited in different types of shelters, at controlled or uncontrolled ambient temperatures, at the optimum slaughter weight, make carcasses of different qualities, which are classified in different quality classes depending on the fattening technology existing on the farm. The swine exploited in the industrial system in a small professional farm during a calendar year for the meat production make at the temperature of 10-12° C, carcasses that fall into the following quality classes at the objective classification: [12,13,15]

- an S class - 5.81%;
- an E class - 13.75%;
- an U class - 39.15%;
- an R class - 30.16%;
- an O class - 9.41%;
- an P class - 1.72%.

The highest weight of the carcasses is classified in the quality classes U and R but in the upper classes S and E were 19.58% of the carcasses, which shows us that the lower temperatures during the fattening period, although the requirement of the swine in this age category, less the optimal thermal comfort, is determined, obtaining the carcasses with lower percentages of lean meat. Fatty pigs exploited for meat production at lower temperatures in shelters without additional heat sources have a higher percentage of fat in the carcass, the weight of lean meat in the carcass being 53.19%. [1,3,9,10]

Pigs fattened at ambient temperatures between 15.0-22.0° C at slaughtering the weight of carcasses with more than 55% lean meat in the carcass is higher compared to pigs fattened at temperatures of 1.0-12° C. In the R and O categories, the weight of the carcasses represents 17.01% but it is found that ensuring the optimum temperature during the fattening phase determines the obtaining of high proportions of carcasses classified in the three upper classes, the weight of 82.99% being held by the higher quality classes. . In this study, the weight of carcasses by quality classes was: [5,6,8,11]

- class S - 31.96%;

- class E - 28.86%;
- class U - 22.16%;
- class R - 15.46%;
- class O - 1.56%.

The adjustment of the microclimate factors in the fattening shelters has favorable effects on the quality of the carcasses, the weight of lean meat being 56.47%, and the carcasses of high quality S and E represent 60.82% from the total carcasses obtained. [2,7,12]

In order to be able to implement high-performance technologies in the fattening sector of small professional farms and to obtain maximum productive indicators and upper-class carcasses, it is recommended by the specialists in the field of raising and exploiting swine for meat on professional farms: [4,14]

- fattening the swine for meat to be made in shelters with controllable microclimate factors;
- the compartmentalization of the shelters should be made according to the capacity of the speakers in the nursery sector;
- the shelters to have systems for regulating feed consumption;
- the optimum temperature in the shelter during the fattening period should be kept between 15.0-22.0° C, in order to obtain carcasses with high percentages of lean meat.

MATERIALS AND METHODS

Within this scientific approach, for the determination of the fat layer at the slaughtering of fatty pigs exploited in small professional farms at different ambient temperatures 12° C and 18° C, measurements were made in order to determine the thickness of the fat layer in the cervical, thoracic, lumbar and abdominal thus: 12° C

- cervical, between the cervical vertebrae 6-7;
- thoracic between the vertebrae 19-20;
- lumbar in 3 points (anterior extremity of gluteus medius muscle, middle of gluteus medius muscle);
- abdominal in the right side of the sternum, flank navel.

The obtained results were statistically processed in order to establish the quality differences between the two operating systems in order to implement the most efficient fattening technology that will contribute to increasing the farm's economies.

RESEARCH RESULTS

The average lumbar measurements in fatty pigs exploited at ambient temperatures of 12°C were 2.2 ± 0.16 cm, the abdominal ones 1.4 ± 0.23 cm and the backs 2.4 ± 0.19 cm.

For carcasses obtained by slaughtering pigs exploited at controlled ambient temperature of 18° C, in modernized shelters on small professional farms, the average of the measurements was 1.8 ± 0.37 cm lumbar, 1.1 ± 0.28 cm abdominal and $1,9 \pm 0.32$ dorsal.

This shows that the low temperatures during the fattening period in shelters without the possibility of temperature control contributes to the inefficiency of the conversion of feed into muscle mass and to the deposition of a greater amount of fat as a protection against cold with higher energy consumption.

The comparative data of the average fat layer measurements determined on the carcasses obtained from pigs operated under uncontrolled and controlled ambient temperature conditions are summarized in the table below.

Table 1.**The thickness of fat layer on fat pig carcasses operated under uncontrolled and controlled ambient temperature**

The temperature from the shelter	Average of lumbar measurements (cm)	Average of abdominal measurements (cm)	Average of the dorsal measurements (cm)
I 12°C	2,2±0,16 ^{ca}	1,4±0,23 ^a	2,4±0,19 ^{ca}
II 18°C	1,8±0,37 ^{Aa}	1,1±0,28 ^a	1,9±0,32 ^{Aa}

Test t, A-a $p \leq 0,001$, A-b $p \leq 0,01$, A-c $p \leq 0,05$, a-a $p \geq 0,05$

Comparing statistically the results obtained from the measurements regarding the thickness of the fat layer on the carcasses resulting from the slaughter of the fatty pigs exploited under temperature conditions both can be observed that:

- at pigs exploited at low ambient temperatures, at all lumbar, abdominal and dorsal measurements, the thickness of the fat layer is higher compared to the measurements regarding the thickness of the fat layer from fatty pigs exploited under controlled ambient temperature;
- the results obtained at the fatty pigs operated under controlled temperature conditions are superior in quality, the thickness of the fat layer being reduced. From the analysis of the data obtained processed statistically is observed:
 - for a significance threshold of $p \leq 0.05$ the differences are significant between the thickness of the fat layer from the lumbar region to the two categories of fatty pigs. In pigs fattened under microclimate conditions controlled at room temperature of 18° C fat deposits in the lumbar region are lower;
 - for a significance threshold of $p \geq 0.05$ regarding the average of the measurements in the abdominal area, the differences are not statistically significant, under different temperature conditions;
 - the differences are distinctly significant for a reference threshold of $p \leq 0.05$ with respect to the thickness of the backbone layer when operating under different ambient temperature conditions.

We note that at low temperatures during the fattening period, it causes fat pigs to accumulate fat reserves, compared to those fattened at optimal controlled temperatures, which deposit large quantities of lean meat in the carcasses and do not have to consume energy to ensure thermal comfort.

Researches were done on fattening technologies shows that pig in general and fatty pigs in our case have biological mechanisms of thermal adaptation to the technological conditions of breeding and exploitation. These thermal regulation mechanisms can be adjusted by using the following management methods in order to improve the fattening technologies and which we propose for implementation in small and medium-sized pig farms:

- thermal regulation by direct contact of the skin with the cold surfaces, from these reasons proposes to be mounted on color pipes that spray water;
- thermal absorption of the skin from the air, which requires the cooling of the air taken from the outside, by the installation of ventilation systems;
- evaporation by perspiration, can be regulated by the effective splashing of fatty pigs with water during the summer periods;
- water consumption by regulating the temperature in the shelter;
- accelerated breathing through the forced introduction of cold air fans from the outside for thermal adjustment and maintaining the optimum comfort temperature in the shelter.

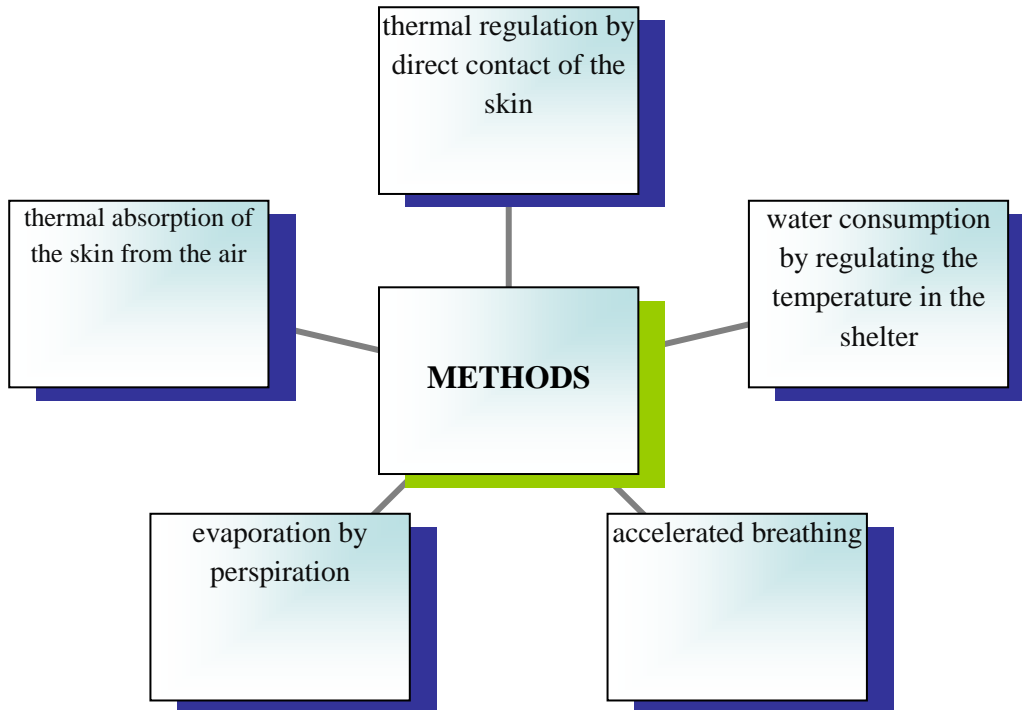


Figure 1. Technological measures to regulate the temperature in shelters for fatty pigs

If the biological thermal adaptation mechanisms listed above are not efficient enough, thermal discomfort is installed in the pig boxes, which is manifested by the following stereotypes:

- search for wetlands;
- increasing water consumption;
- accelerating the pace of breathing;
- decreased food intake.

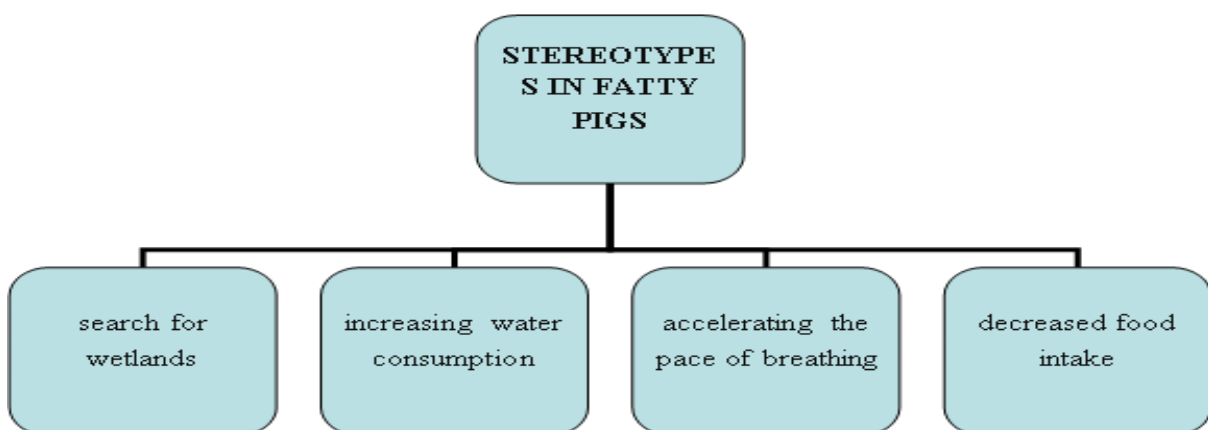


Figure 2. Stereotypes in fatty pigs in case of non-compliance with thermal comfort

Failure to ensure the optimal temperature in fatty pig shelters, due to poor production technologies, results in physiological and behavioral changes in fatty pigs. These changes are presented according to the ambient temperature in the table below:

Table 2.**Behavioral changes in fatty pigs depending on temperature variations in shelters**

Item	Behavioral changes in temperature variations			
The temperature from the shelter	12°C	15°C	18°C	26°C
Breaths / minute	32	38	76	88
Internal body temperature	39°C	39,1°C	39,3°C	39,5°C
External body temperature	31,5°C	34,8°C	36,3°C	37,1°C
Stereotypes in fatty pigs	Stirring, piling in the dry areas of the heating box	Lack of agitation, the speaker is kept clean	Well-being, quiet animals in the dry storage room, bliss	The animals are agitated and look for wet areas to cram into the water

It is observed that at the temperature of 12° C, provided by the fattening technology the internal temperature of the fatty pigs does not change;

- the number of breaths per minute is reduced;
- stereotypes such as: agitation of pigs, non-observance of dry areas in the box appear;
- the animals are crowded to warm up,

Implementation of modern technologies with the control of microclimate factors, at the temperature of 18 ° C, we find that the pigs fattened:

- ✓ are calm and rest after consuming food;
- ✓ the speakers are well organized, keeping a dry and moist area;
- ✓ the group hierarchy is maintained for feeding, watering, eating, resting.

CONCLUSIONS

The low temperatures during the fattening period from the shelters that do not have temperature control systems according to the physiological needs of the fatty pigs, determine the accumulation of fat reserves in the carcasses, compared to the fatted pigs at optimal controlled temperatures, where large quantities of meat are deposited, the individuals never having to consume energy to ensure thermal comfort. The deficient exploitation technologies of the small professional farms, the lack of the possibilities of regulating the ambient temperature, determine physiological and behavioral changes in the fatty pigs. At controlled environmental temperatures, during the fattening period in the professional farms it is found that fatty pigs maintain their group hierarchy, are quiet, consume and convert the food well into the growth spur, lean meat, keeping in the boxes a dry and a wet area and at slaughtering the obtained carcasses are classified in the higher quality groups in terms of the proportion of meat in the carcasses.

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