WAYS TO IMPROVE MANAGEMENT DURING THE GESTATION PERIOD OF SOWS

DEKANY ALEXANDRU TIBERIU[1], MUNTEAN MARIUS[1], MARIN DIANA[1], VĂDUVA LOREDANA[1], PETROMAN IOAN[1],

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

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

Abstract: *The performances achieved by the sow exploitation units for the production of piglets are given by the technologies implemented on the technological flow and by the best management implemented, on each sequence of the sow exploitation systems in different physiological stages. The managerial measures implemented in the gestation sector, were meant to improve the economic results of the operation, being quantified by higher reproduction indices obtained. In order to ensure the welfare and maintenance of pregnant sows in conditions of economic efficiency, investments are needed to ensure the microclimate factors, and the space necessary for maintenance in common boxes to improve the technological management. The use of feeding models with optimal minimum or maximum feed administered daily, contributes to the reduction of embryonic mortality and increased prolificacy, the differences being statistically significant (test t) at a significance threshold $p<0.05$. By feeding pregnant sows daily or once every two days by doubling the amount, the longer period between feeds did not have a negative influence on the fecundity, prolificacy and uniformity of the piglets in calving and the duration of gestation.*

Key words*: management, operating systems, sows, gestation*

INTRODUCTION

Biological material used for reproduction cannot perform at its true biological value unless it is provided with conditions under which to perform [4, 5, 14]:

- maintenance in accordance with the requirements on physiological conditions;
- nutrition according to milk production, growth and development of piglets in gestation period;
- technological and ethological microclimate conditions;
- ensuring health status;
- maintaining the best conditions for well-being.

Modern technologies for the exploitation of sows for economic performance must comply with the needs of animals in physiological and production conditions, distinguishing within production systems [7,8,11]:

- breeding and exploitation technologies specific to breeding boars comprising:

a. purchase of boars used for artificial insemination;

b. feeding according to harvest intensity;

c. maintenance with welfare and microclimate conditions;

d. exploitation intensity according to performance, and genetic value.

- technologies for the procurement of replacement and exploitation of sows pending sowing comprising [1, 2, 10, 15, 18]

a. providing sows for replacement;

b. providing 10% of the sow herd for sowing;

c. nutrition control according to the maintenance status of weaned sows;

d. ensuring the conditions regarding maintenance and well-being;

e. organization of reproduction: detection of heat, stimulation of heat onset;

f. artificial insemination management [16]

- technologies for breeding and exploitation of sows and gilts, comprising [3, 9, 12, 13]:

a. nutrition systems on physiological states;

b. maintenance systems;

c. welfare and microclimate assurance systems;

d. gestation control management systems.

- operating technologies in maternity hospitals, including:

a. feeding systems for sows with piglets;

b. puerperium control systems;

c. maintenance systems for sows and piglets with microclimate control possibilities;

d. separate rest areas for sows and piglets;

e. separate sources for providing drinking water to sows and piglets;

f. health and well-being control systems.

Knowing the amount of feed consumed is important in the overall process of managing food at discretion, the amount consumed being affected by the energy density of the diet, ambient temperature and food quality and a number of other management factors, such as feeder design. Regardless of the farming technology, pigs require six general classes of nutrients: water, carbohydrates, lipids, quality proteins, mineral salts and vitamins, which must be provided by age categories, types of production, physiological conditions where productive performance is to be achieved [17].

MATERIALS AND METHODS

During the gestation period in sows, anabolism predominates due to progesterone and fetal demands, metabolic activity is influenced by hormonal and fetal factors it is considered that the feed must be ensured to the optimum minimum in the first part of this physiological stage and in the second when catabolism predominates and the piglets develop the quantities of feed must be increased but without fattening the sows. In this scientific approach, the artificially inseminated sows were housed in individual boxes, until the early control of gestation, then the first batch was introduced in common boxes and in common boxes throughout the gestation period the other two groups depending on the objective pursued:

-maintenance system;

- nutritional model.

The sows were fed on physiological stages, for the efficient use of feed, according to the minimum or maximum model, the food being administered once a day or once every two days in a batch, during gestation periods depending on the intensity of growth and development, zygotes, embryos and piglets: 11-60 days, 61-113 days, 114 days, the results obtained were statistically processed in order to propose new managerial measures regarding the exploitation of sows during pregnancy.

RESULTS AND DISCUSSIONS

The managerial measures implemented during the gestation period of the sows will have the purpose of improving the results of the exploitation quantified by reproduction indices obtained in order to improve the following systems: welfare, maintenance, nutrition, biosecurity.

In order to ensure the welfare and efficient maintenance of the use of built-up areas, modern technologies for the management of sows in management must provide:

- improving technological management and nutritional management;

- ensuring the necessary space and microclimate factors to ensure well-being;

- maintenance in individual and common boxes.

A. Improving technological and ethological management. The proposed managerial measures must contribute to the efficiency of exploitation in this physiological phase, by reducing the unproductive days of sows and increasing the production of piglets, we analyzed through the studies performed two maintenance systems, comparing reproductive indices, results obtained, fecundity, birth rate, prolificacy and lactation of flocks of sows. The research was carried out on 30 sows/batch heads that were sown and housed according to the following model:

- individual speakers until the gestation is established;
- common speakers up to 113 days of gestation

The reproduction indices obtained from the research highlight the fact that

1. in sows kept in individual pens until the ultrasound check of the gestation have carried out:

- fertility rate 95.05%;
- birth rate 94.02%;
- prolificacy at parturition 11.75 ± 0.28 piglets;

2. in sows kept in boxes of 20 heads up to 113 days of gestation have carried out:

- fertility rate 93.44%
- birth rate 92.14%
- prolificacy at parturition 10.93 ± 0.38 piglets.

It is found that the reproduction indices vary depending on the maintenance system for these reasons for their improvement we recommend for the gestation period in professional farms:

- because the prolificacy is similar, we recommend giving up the maintenance of the sows sown in individual boxes in the first part of the gestation, but in common boxes with 10 heads;

- avoiding the stress of the sows by joining the batches after establishing the state of gestation;

- giving up the design of individual speakers until the state of gestation is established because the cloistering does not determine the obtaining of reproduction indicators that would justify large investments in technology.

Carrying out new research to highlight the role of the maintenance system on breeding indices and to be able to propose new models of maintenance of pregnant sows in individual boxes up to gestation control and in common boxes of 10 heads throughout the gestation period, we found that:

Table 1.

Reproductive indices during gestation in maintenance systems

Sows (number)	Fertility (%)	Prolificacy (number)	Average piglet calving weight (grams)	Type of boxes
Sown (40)	-	-	-	
Pregnant (37)	92.50	11.68±0.21a	1341±0.22A	individually
Sown (40)	-	-	-	
Pregnant (37)	92.50	11.20±0.19a	1291±0.31c	of 10 heads

Test t A-a $p<0,001$, A-b $p<0,01$, A-c $p<0,05$, a-a $p>0.05$

The fertility rate for the two maintenance systems was:

-92.50% in sows maintained in individual boxes until gestation control and then in boxes of 10 heads up to 113 days;

-92.50 for sows kept in the same type of box throughout the gestation period.

Prolificacy depending on the maintenance system of sows during pregnancy had the following values:

-11.68 ± 0.21 piglets per sow maintained in the individual box 36 days of gestation;

-11,20 ± 0,19 piglets per sow maintained in a common box of 10 heads throughout the gestation period, statistically the difference was not significant at a significance threshold (test t) $p>0,05$ for this indicator;

The calving weight of the piglets was higher in sows kept in individual boxes of 1341 ± 0.22 grams, compared to 1291 ± 0.31 grams in those kept in boxes of 10 heads, statistically the difference was significant (test t) at a significance threshold $p<0.05$.

We propose a management system for professional farms in the gestation sector based on these results that contribute to:

1. Improving the fertility rate:
- detection of sows 17 days after sowing for returns;
- early control of gestation by different methods;
- avoidance of twinning stress.

2. Improving the birth rate:
- parturition assistance;
- hormonal stimulation of parturition;
- ensuring the well-being and microclimate in maternity hospitals;
- measures to care for piglets during parturition.

3. increase the prolificacy of parturition:
- measures to improve prolificacy:
- the maintenance of pregnant sows for the entire gestation period 1-113 days in common boxes, because the investments made in technology do not lead to better values of prolificacy;
- subdivision of sows according to body development and parity, in order to avoid altercations in establishing the group hierarchy;
- early gestational control with the help of test boars before early ecological gestational control.
- ensuring well-being through sufficient rest areas, feeding, watering, microclimates.
- maintaining biosecurity, avoiding stress in this sector.

4. weight gain at calving:
- feeding sows on physiological conditions, with balanced rations according to the requirements of the piglets;
- avoid fattening sows;
- ensuring well-being to avoid abortions;
- maintaining the appropriate microclimate to avoid embryonic mortality;

B. Improving nutritional management. Feeding pregnant sows and gilts we believe that we must take into account the following aspects: the development of fetuses, the completion of primiparous growth, ensuring the necessary for vital functions. In addition to the high need for protein to ensure the growth of embryos occurs during pregnancy:

- change in the basal metabolism of sows due to internal burns caused by an increase in the number of embryos;

- development of the mammary gland.

Depending on the evolution of the body weight of sows and gilts during pregnancy, we can assess whether the nutritional management has implemented the most efficient

feeding systems. We recommend for professional sow farms for the production of piglets, nutritional management must ensure the accumulation of the following weights:

- 25-30 kg for sows that have completed their rearing and development period;
- 28-35 kg for primiparous sows that have not completed breeding.

We propose to achieve these weight gains because through the new managerial methods of nutrition implemented, we want to properly train the sows but not to fatten them, that it is more efficient to feed them stimulatively in lactation to increase production than to consume from their own reserves for the production of milk, even if specialists recommend weights of 33-35 kg for sows and 36-40 for primiparous. We found that females with heavy weights accumulated during pregnancy have in labor:

• low prolificacy;
• non-uniformity at parturition;
• difficulties in expelling piglets;
• aggression and behavior change in sows.

Although most researchers recommend an optimal protein level of 14.00% for pregnant sows, and 3100 kcal EM/kg combined feed, we believe that this level is at the minimum threshold and should be increased by 2.0% because the biological value of proteins does not provide the necessary essential amino acids and with 150-200 kcal EM/kg combined feed. Based on the experience gained in the breeding and exploitation of sows for the production of piglets, we recommend the following quantitative feeding regimes for pregnant sows at minimum or maximum level as follows:

Table 2.

Ration models for pregnant sows during gestation

Gestation period	Minimum level (kg)	Maximum level (kg)
1-10 zile	2.80-3.00	3.10-3.60
11-60 zile	2.10-2.20	2.30-2.40
61-113 zile	2.80-3.00	3.10-3.60
114-115 zile	2.10-2.20	2.30-2.50

We recommend combined fodder to be administered according to the technology implemented on the farm as follows:

• in the form of dry fodder administered in one batch per day;
• in the form of dry compound feed administered once every two days by doubling the amount;
• in the form of wet feed ratio of 1: 1;

Comparing the feeding systems during gestation according to the models proposed by us, on a herd of 100 sows for each model, the following reproduction indicators were obtained:

➢ the 100 sows fed according to the model with a minimum quantity, fed in one game per day made:

a. fecundity of 93.20%;
b. the prolificacy of 10.92 ± 0.22 piglets/sow;
c. the duration of calving between 1-2 hours;
d. the batches of piglets were uniform;
e. the number of non-viable and dead piglets at calving was reduced (0.60%);
f. the gestation duration was 114 ± 1.30 days;

➢ the 100 sows fed daily according to the model with maximum quantity made:

a. fertility 94.40%;
b. the prolificacy of 11.78 ± 0.36 piglets per sow;

c. duration of calving 2-3 hours;

d. the batches of piglets were uneven;

e. the number of dead piglets at calving was increased (1.08%);

f. the duration of gestation was 115 ± 2.20 days;

- the 100 sows fed once every two days according to the model with the minimum quantity achieved the following performances:

a. fecundity of 92.77%;

b. the prolificacy of 10.96 ± 0.33 piglets per sow;

c. the births took place normally;

d. there were no dystocic calvings;

e. the batches of piglets at calving were uniform;

f. the number of dead and non-viable piglets was reduced (0.16%)

g. the duration of gestation was 114 ± 1.80 days

It follows that reducing the amount of feed administered daily during pregnancy to a minimum level contributes to:

- reduction of embryonic mortality;
- increasing prolificacy.

The differences were statistically significant (test t) at a significance threshold $p<0.05$, between the two groups fed according to food supply models, minimum without excessive fattening of sows and maximum when fattening and use of reserves for milk production.

The administration of food once a day at a minimum level or once every two days by doubling the amount highlights the fact that similar economic results were obtained, the longer period between feeds did not have a negative influence on the fecundity, and prolificacy and uniformity of piglets calving and the duration of gestation were not extended. Well-kept sows respond better to stimulant feeding during lactation and produce a larger amount of milk than fattened ones, which use their own reserves to ensure the milk supply of piglets.

In order to obtain adequate economic results in professional swine farms, we recommend the implementation of new managerial measures regarding the nutrition of pregnant sows:

- feeding systems for pregnant sows on physiological conditions;
- administration of dry food;
- feeding at a minimum level, the food being administered once a day or once every two days with doubling the ration;
- avoid fattening sows in gestation;
- stimulating milk production in maternity hospitals by stimulating fodder at discretion.

CONCLUSIONS

The gestation phase at the sow is the central reference point of all endocrine functions of reproduction, where it acts correlated three systems for its normal development, endocrine preimplantation, metabolic-homeostatic-endocrine and endocrine postimplantation. Hormones secreted by the endocrine organs of the female, the placenta and the fetus are involved in the maintenance of the sow's gestation, for these reasons, managerial solutions for gestational maintenance and physiological nutrition should help to avoid estrogen-progesterone imbalances that cause ovulation delay in the female genital tract and aging or rapid passage and non-implantation of zygotes. Other managerial measures were intended to avoid excess fodder in certain stages of gestation, which causes

embryonic mortality and ensuring optimal operating conditions throughout the gestation period.

The prolificacy of sows kept in common boxes reached values of 11.20 ± 0.19 piglets/sow at parturition, but the difference was not statistically significant at a significance threshold $p>0.05$, compared to those kept in individual boxes until early gestational control, but in terms of calving weight of piglets the difference was statistically significant the average weight of piglets obtained from sows kept in individual pens until early gestational control was 1341 ± 0.22 grams, compared to only 1291 ± 0.31 grams in sows kept in common boxes.

The use of feeding models with optimal minimum or maximum feed administered daily, contributes to the reduction of embryonic mortality and increased prolificacy, the differences being statistically significant (test t) at a significance threshold $p<0.05$. By feeding pregnant sows daily or once every two days by doubling the amount, the longer period between feedings did not have a negative influence on the reproductive rates and the duration of gestation was 114 ± 1,30 days in the first case and 114 ± 1, 80 days in the second case.

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