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Influence of the Live Weight of Incorporation of the Gilts on the Mortality and Productive Indicators of the Piglets

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Abstract

A total of 80 gilts were selected and divided into two experimental groups of 40 animals each. Group I, grouped gilts with weights of 118 to 124 kg. And group II, those weighing more than 130 kg. The weight of incorporation of the gilts, as well as the litter size and the birth weight, at the weaning and average daily gain of the piglets, were controlled through simple ANOVA; in addition to relating the weight of incorporation of the gilts with the litter size, birth weight and weaning by linear regression, using the program Stagraphics plus 5.1. The results showed that there is a strong and positive relationship between the weight of incorporation of the gilts and the productive indicators of the piglets, which were always higher in the incorporated gilts weighing more than 130 kg. It was shown that more live piglets are born from incorporated gilts weighing more than 130 kg and that mortality is higher when the incorporation weights are lower than this. It was verified that in the incorporated gilts with less than 130 kg of live weight, 50575.00 Cuban pesos loosen benefits for fewer live born piglets.

Keywords: Gilts; Live weight; Productive indicators; Incorporation

Introduction

Feed for animal's crisis in the underdeveloped countries has increased and continues to grow in the production of proteins of high biological value necessary for man. The pork industry is an important solution, triggered by two variables that have strongly influenced the market. First: the challenge that has presented in recent years poultry, due to the appearance of bird flu; second, the sharp rise in the price of beef, which allows the pork industry to be the ideal to supply this demand in a short time and at affordable prices [1].

Taking into account the biological specificities of the swine species, particularly their high fertility, reproductive behavior constitutes an essential part of the species' productivity. It is therefore that any effort in order to increase the yield implies increasing fertility, prolificacy and productive expression of piglets [2].

Puberty is the stage in which animals become physiologically capable of reproducing and manifests itself before their anatomical development has been satisfactorily completed. This is why animals should not be incorporated into reproduction immediately after reaching puberty, as their subsequent development is compromised.

There are multiple factors involved in the appearance of oestrous in sows, marking the onset of puberty, as well as subsequent jealousy. Age, weight and growth rate; nutrition, genetics, environmental factors, housing conditions, prophylaxis, social environment and boar effect are the main aspects that directly influence the sexual behavior of the breeders [3].

The manual referred to above recognizes, in the category of gilts, females older than 7 months of age weighing not less than 95 kg., which maintain that condition until they are not service. These should have the following characteristics:

- Have had a good development in weight gain during growth, without over fatten. Must weigh not less than 110 kg. the first service.
- Do not have affections in the extremities.
- Not less than 10 breasts symmetrical (or blind or inverted).
- Healthy appearance.

For our country, it is a challenge to raise the productive yields of the gilts, as well as to reduce the mortality in these; currently it is established to server the gilts that have reached a weight greater than 110 kg. of live weight and more than 210 days of age. The objective of this research is to determine how influences the live weight of incorporation of gilts in the mortality and productive yields of its piglets.

Materials and Methods

The work was carried out in the pig unit La Guayaba, belonging to the Integral Military Farm "El Guatao", located in Guanabacoa municipality, province Havana. Eighty gilts, the race F1-Yorkland were intentionally selected, weighed and grouped according to their live weight in two groups of 40 animals each. In group I, the gilts with weights ranging from 118-124 kg were studied and in group II, those weighing more than 130 kg. The age of the animals ranged from 248 to 274 days, according to the controls of the farm.

Both experimental groups were subjected to the same conditions of exploitation and management. The feed offered was feed growth, with an average consumption of 2.7 kg/animal/day in a single ration, which does not coincide with the feeding norms established in the Manual de Crianza Porcina, which states that breeding should consume reproductive feed, supplied in 2 or 3 servings [4].

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The consumption of feed growth, by this category, is a critical aspect, because it is not able to contribute to the diet of these animals all the nutrients, nor in the adequate amounts, since the sows are too greasy and can have deliveries dystocia, problems with conception and reduce feed intake during the lactation period, affecting the development of their piglets.

The live weight of incorporation of the gilts was controlled, when they were service by direct mountaineering, performing two services to each female, with intervals of approximately 12 hours. The procedure after the service, was in accordance with what is regulated in the Manual de Crianza Porcina [4]. The piglets, born of the mothers that made up the experimental groups, were counted, thus determining the litter size, were then weighed at birth, whit in a weight of 50 kg of 1 kg ± appreciation and weaned (26-33 days), determining through these values the average daily gain (ADG) of the piglets through the formula, proposed by Romero et al. [5].

ADG=PF-PI/duration stage

Where:

ADG=Average daily gain; BW: Birth weight; WW: Weaning weight; Duration stage: Time from birth to weaning.

The analysis of the ADG, birth weight and weaning weight of the piglets, as well as the weight of incorporation of the gilts was performed through simple ANOVA, included in the statistical package Stagraphics plus 5.1 and linear regressions were made through the equation Y=a+b*x, where the weight of the gilts was the independent variable in the equation and the indicators of the piglets (litter size, birth weight and weaning weight) were dependent variables. The presentation of sick and dead piglets in each group was monitored through clinical examination, detecting any symptoms of disease and recording the incidences in the controls of the farm. With the help of the program COMPROP 1, the proportions of the number of sick and deaths piglets between groups were compared [6].

The economic valuation took into account the losses caused in the production of meat by the number of piglets live births in each group, taking into account the kilograms of meat that represents a greater number of live births. On the other hand were quantified the losses that represent the deaths produced by reason of the value of life of a piglet. Losses in meat gain were expressed in kg, while mortality losses were expressed in Cuban convertible pesos (CUC).

Results and Discussion

In the following Tables 1-5, is observed, the behavior of live weight of incorporation of the gilts in both experimental groups. The analysis shows that there are highly significant differences between live weights at the incorporation of gilts in the studied groups, with confidence levels of more than 99.9%, with differences of 18 kg between the means of both groups.

The following table shows the behavioral of the productive indicators of the piglets in each group studied. The results of the simple ANOVA to the productive indicators of the piglets, in general, showed superiority for the group of gilts that was incorporated in the reproduction with live weights superior to 130 kg., with confidence levels of more than 99.9%. These results coincide with that posed by Martin Rillo et al. when affirming that sows, when they increase their live weight, increase the size of the genital apparatus and have a greater capacity of ovulation and viability of the embryos, reason why they obtain greater litter [7].

Boyle et al. suggested that sows with a weight of 90-100 kg live weight tended to have a smaller number of piglets and with low birth weight, since the sows do not have the reserves necessary to develop piglets with optimal weights at and that piglets that are incorporated with low live weight are more likely to suffer physical disorders linked to reproductive life, which requires good physical and metabolic conditions to cope with the catabolic periods from which the reproductive must be replenished and reintroduce in the permissible time not to affect the zootechnical flow [8].

Faccenda pointed out that thin gilts do not manage to regain weight during lactation, thus compromising the success of subsequent pregnancies; being more susceptible to traumatic and decubitus injuries due to the shortage of fat, as well as frequent premature births and low birth weight piglets [9].

Wbrehme reports that the ideal weight of incorporation into reproduction is over 130 kg [10], to obtain piglets with better birth weights and, on the other hand, Quiniou et al. stated that piglets born with lower weight showed lower productive indicators than the rest of the piglets [11].

Regarding the ADG of the piglets, Aherne and Palomo highlighted the weight of mothers during breastfeeding as a defining element [12,13]. Casasola and Palomo stated that the weight with which the sows face gestation directly affects the quantity and quality of their dairy production and therefore the development of their piglets [14]. The following is the analysis of the influence of live weight of incorporation of the gilts on the litter size. For group I, 63.8% of variability of litter size and for group II was explained 50.6%, the correlation coefficient of 0.7 being expressed for both groups, indicating a moderately strong relation between the incorporation weight of the gilts and litter size.

These results coincide with what was proposed by Rodríguez et al. [15] who show that the gilts that receive the first service with lower weight obtain smaller litter, and with Romero [16], which affirms that the incorporation weight is an important factor to take into account since it influences the size of the litter. The following are the live weight of incorporation of gilts and the weight with which their piglets are born.

The results obtained show that birth weight is influenced by the incorporation weight of the gilts; on the one hand R^2 explains in group I 31.9% variability in birth weight and 12.2% group incorporated with greater weight. In group II, the correlation coefficient of 0.3 indicates a relatively weak relationship between the two variables under study and for group I, the correlation of 0.5 indicate a moderately strong relationship between these variables.

The results agree with the criteria of Merck, which states that birth weight is directly related to the live weight with which the gilts are incorporated [17]. This criterion coincides with Milkil, which emphasizes the need for the gilts to be incorporated with an adequate weight, since it is a determinant element in the weight of their cries at birth [18]. The following table shows the results of the regression analysis between the incorporation weight and the weights with which the piglets were weaned.

The R-square, explains 60.2% variability in group I and 19.3% in group II. The P value is less than 0.001, which shows that there are

Groups	Mean (kg)	SD	± SE	CV	Sig.
I	119.9	1.9	0.3	1.61%	***
II	137.9	3.3	0.5	2.39%	

***=P<0.001

Table 1: Analysis of live weight of incorporation.

Indicators	Mean		SD		± SE		Sig.	
	GroupI	Group II	Group I	Group II	Group I	Group II	Group I	Group II
LS	8.3	11.8	1.1	1.6	0.1	0.2	***	
BW	1.08	1.31	0.13	0.07	0.02	0.01		
WW	6.67	7.6	0.5	0.3	0.08	0.05		
ADG	169.2	190.6	15.2	9.3	2.4	1.4		

***=P<0.001; Legend: LS: Litter Size; BW: Birth weight; WW: Weaning weight; ADG: Average daily gain

Table 2: Behavior of the productive indicators of the piglets in each group.

Variables	Groups	R^2 %	r	± SE	Sig.
IW vs LS	I	63.8	0.7	0.6	*
	II	50.6	0.7	1.1	
Y=a+b*x (LS Group I=-48.03+0.047*IW); y=a+b*x (LS Group II=-36.6+0.35*IW)					

*=P<0.05; Legend: IW: Incorporation Weight of the gilts; LS: Litter size

Table 3: Relationship between incorporation live weight and litter size.

Variables	Groups	R^2 (%)	r	± SE	Sig.
IW vs BW	I	31.9	0.5	0.1	*
	II	12.2	0.3	0.07	
Y=a+b*x (BW Group I=-3.7+0.04*IW); Y=a+b*x (BW Group II 0.2+0.01*IW)					

*=P<0.05; Legend: IW: Incorporation Weight of the gilts; BW: Birth weight of piglets

Table 4: Relationship between birth weight of the piglets and incorporation weight the gilts.

Variables	Groups	R^2 (%)	r	± SE	Sig.
IW Vs. WW	I	60.2	0.7	0.3	***
	II	19.3	0.4	0.2	
Y=a+b*X (WW Group I=-19.2+0.2*IW); Y=a+b*X (WW Group II=-48.7+1.02*IW)					

***=P<0.001; Legend: IW: Incorporation weight of the gilts; WW: Weaning weight

Table 5: Relationship between live weight of incorporation and weaning weights.

highly significant differences with a confidence interval of more than 99.9%. Ponce de León states that the piglets born of sows with lower live weight consume milk with nutritional deficiencies qualitatively and quantitatively, since the sow needs to mobilize from its body reserves for milk production, decreasing its weight more and more live and therefore, producing less and less milk with less nutritional quality, so the piglets decrease their live weight [19].

These results are similar to those presented by Santiago who refers to the importance of live weight of the sows in the reproductive process [20]. In this regard, Casasola and Palomo argue that nutritional problems, during or before the gestation phase, can determine, in the sows, inferior weights to the ideals and then, in the affectation of the quantity and quality of their production milky and therefore in the development of their piglets [14]. The main causes of diseases and deaths were caused by colibacillosis, pneumopathies, crushes, umbilical hernias and perichartritis. The following figure shows the result of the comparison of proportions, among the groups studied, regarding the presentation of diseases and deaths.

Figure 1 shows the percentage that represents, in each of the groups, the sick and dead piglets of the total number of live born piglets (LBP). For group I was 332 and in group II of 472 LBP, with a difference between the groups of 140 piglets in favor of the group of gilts incorporated with more than 130 kg of live weight. The incidence of sick and dead piglets was always higher in group I, with high levels of significance, coinciding with what Alonso et al. when referring to the fact that when the age and incorporation weight are violated, the females do not reach a somatic development, which increases the probability of dystocical births and piglets more susceptible to diseases [21].

Qiles and Hebia for its part suggest that a low incorporation weight determines a poor productive yield, reflected in increased susceptibility and deterioration of the health status of their cries [22]. During the lactation period, low-weight snacks are forced to use body reserves (use of fat as a source of energy and muscle as a source of protein) in their dairy production, causing their bodily condition to be affected and therefore, the gradual deterioration of the health status of their piglets.

These criteria coincide with that proposed by Merck and Bernard, who refer to the mortality of pigs and other animals determined by the deterioration of the physical condition of their mothers, when crossing periods with high energetic requirements such as lactation [17,23].

Economic Valuation

When comparing the obtained productive results, in the studied groups, it is observed that, in general, the productive yields of the piglets born, of gilts with greater weight, were superior to those obtained in the group incorporated with lower average live weight, as well as the incidence of sick and deaths was more unfavorable in this group.

Based on the analysis, in the comparison of the live births in each groups, there is a difference of 140 more piglets obtained in the group of gilts incorporated with greater weight and considering that the live weight at slaughter, planned by the unit, is 85 kg, a total of 11 900 kg, which represents 50575.00 Cuban pesos (CUP) are no longer produced, only for this concept, in the group of gilts with lower weight

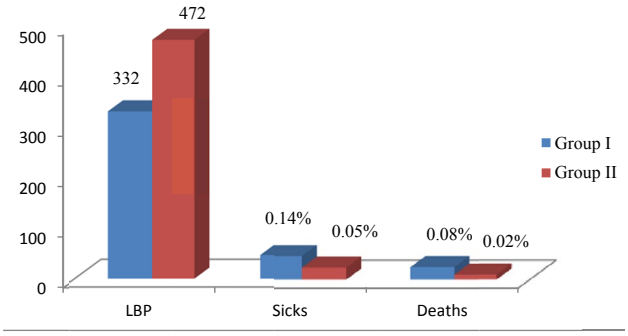

Figure 1: Proportion of sick and deaths piglets in the studied groups.

of incorporation. This is taking into account that the kg of standing meat has a value of 4.25 CUP.

In the group with less live weight, 25 deaths occurred, representing losses of 85.00 CUC, according to the current value of a piglet (3.40 CUC), while in the group with the highest live weight, only 10 deaths, with losses of 34.00 CUC, representing savings, only for this concept, of 50.60 CUC with respect to the group incorporated with lesser live weight.

Conclusions

- There is a relationship between the live weight of the piglets and the litter size, birth weight and weaning weight.
- Production indicators behaved higher in the group of gilts incorporated with more to 130 kg live weight.
- Were born, 140 piglets, less in the group of gilts incorporated with less than 130 kg, loosen benefits for 50 575CUP.

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