

# RESEARCH REGARDING REPRODUCTIVE PERFORMANCE RECORDED FOR LANDRACE X YORKSHIRE CROSSBREED SOWS USED FOR BACON PRODUCTION

C. Radu<sup>1\*</sup>, G. Hoha<sup>1</sup>, Lucia Dănăilă<sup>1</sup>, Tr. Atanasiu<sup>1</sup>, B. Păsărin<sup>1</sup>

<sup>1</sup> University of Agricultural Sciences and Veterinary Medicine Iasi, Romania

## Abstract

*In this study we intend to present reproduction performance recorded at Landrace x Yorkshire cross bred sows exploited for bacon production in an elite unit in Denmark. We have investigated several reproductive parameters: fecundity (depending on season and number of farrowings), index of using sows for reproduction, prolificacy, number of piglets farrowed dead and the survival percentage to weaning. The obtained results were: average fecundity is of 92%; the average index of use for reproduction is of 2.33; the average number of piglets farrowed alive is of 14.48; the number of piglets farrowed dead is of 1.5. The results are a consequence of valuable genetic material, as well as of the technology applied in the unit. The results are situated within the data presented in the specialty literature for these parameters.*

**Key words:** sows, reproduction, fertility, prolificacy

## INTRODUCTION

In the current growth and exploitation of pigs is considered that prolificacy is optimal when the number of piglets birth is equal to the number of sows tits (about 14 piglets) [2], [5].

Overcoming prolificacy over this limit is usually accompanied by the reduction in birth weight and piglet vitality. It also requires the allocation of too high prolificacy supernumerary piglets from other sows or less, increasing their artificial process that does not always give satisfactory results.

Increasing prolificacy can be achieved by using either breeding sows belonging to high yield hybrids is the use of tri or tetra racial half breed sows.

Hybrids sows made from a combination of maternal and paternal breeds due to the phenomenon of heterosis, achieved a 10-15% higher prolificacy than pure breeds [3],[5].

Prolificacy depends on many factors, including age and sows. Normally less than prolific in the first parturition, increasing progressively to III-IV parturition, parturition is maintained until the will then begin to decline.

To achieve a relatively constant prolificacy farm heifers is recommended that the number does not exceed 20% of the total number of sows and older sows to be reformed in time [1].

## MATERIAL AND METHODS

In order to establish the reproduction performances, the research have intended to take into account 90 **Landrace x Yorkshire** cross-bred sows, exploited in a current manner within the farm **S.C. C&C Bluhm Pedersen**, being divided in 3 batches:

- batch L1 – 30 sows fed in pens with the capacity of 5 heads;
- batch L2 - 30 sows fed in pens with the capacity of 10 heads;
- batch L3 - 30 sows fed in pens with the capacity of 15 heads;

Having as point of departure this conjuncture, it was considered necessarily that for the three batches within the experiments should be studied the following reproductive indicators:

- *fecundity;*
- *index of using sows in reproduction;*
- *prolificacy of females depending on season and number of farrowing;*
- *number of piglets farrowed by a female;*

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\*Corresponding author: raducipan5@yahoo.com

The manuscript was received: 22.03.2012

Accepted for publication: 12.09.2012

- mortality of piglets in maternity and their causes.

The working method included the groups of animals. The experimental conditions were those commonly applied by the production technology in the unit, the technological flow being undisturbed.

The animals received identical conditions of accommodation and feeding throughout the experimental period.

## RESULTS AND DISCUSSIONS

### 1. Fecundity obtained at sows in the experimental batches

As concerns fecundity, there is analyzed the concrete situation of the number of pregnant females after mating or artificial insemination. Table 1 presents data referring to the percentage of fecundity obtained from Landrace x Yorkshire cross bred sows, exploited in pens of different capacities, depending on the number of farrowing.

Table 1 Fecundity of sows in the experimental batches, depending on the number of farrowing

Farrow	Batch	No. of inseminated sows	No of pregnant sows in 21 days		No of pregnant sows in 28 days	
			No.	%	No.	%
I	L1	30	28	93.33	28	93.33
	L2	30	28	93.33	27	90.00
	L3	30	27	90.00	27	90.00
II	L1	30	28	93.33	28	93.33
	L2	30	28	93.33	27	90.00
	L3	30	28	93.33	28	93.33
III	L1	30	28	93.33	28	93.33
	L2	30	28	93.33	28	93.33
	L3	30	28	93.33	28	93.33
IV	L1	30	29	96.66	28	93.33
	L2	30	29	96.66	28	93.33
	L3	30	29	96.66	28	93.33
V	L1	30	29	96.66	27	90.00
	L2	30	29	96.66	28	93.33
	L3	30	29	96.66	27	90.00
VI	L1	30	27	90.00	27	90.00
	L2	30	27	90.00	27	90.00
	L3	30	27	90.00	27	90.00
Average ( $\bar{X}$ )	L1	30	28.16	93.88	27.66	92.22
	L2	30	28.16	93.88	27.50	91.66
	L3	30	28.00	93.33	27.50	91.66

According to the data presented in table 1, one can state that the average of fecundity at the first control of the sows in the 3 experimental batches during the 6 farrowing has been close one to another, being situated between 93.33% in the batch L3 and 93.88% in the batch L1, insignificant differences being registered between batches.

The maximum value of the fecundity has been registered in the third and fourth farrowing (96.66%) to all the three batches and the minimum value has been registered in the first, respectively the sixth farrowing (90%).

A common trait of the three experimental batches is the descendant trajectory of the

curve of fecundity towards the last farrowing of the sows, but being corresponding from an economical point of view.

As for the fecundity of sows in the second control (28 days), this one is smaller than in the first control with about 2%.

The highest value of the fecundity in the second control was registered in the case of the second, third and fourth farrowing (93.33%) and the lowest value (90%) was registered at the first and the sixth farrowing, therefore to the end of the economical period of exploitation, so that we can state that the percentage of fecundity decreases with age. Between the average values of fecundity

from the second control there were not registered significant differences.

The descending slope of the curve, encountered while advancing in age is normal, considering the fact that the sequence of farrowing results in lower body strength and increase the likelihood of some gynaecological affections.

**2. Index of using sows to reproduction**

The reproduction indicator that better expresses the concern given to the sow (care, food, rearing, etc.) is the index of using sows to reproduction. This indicator shows us how efficiently are used the sows in the farm, an essential aspect in the amortization of costs.

The index of using sows (Ius) or the index of using sows expresses the average number of farrowing obtained from a sow during a year. The size of this index is determined by the duration of a cycle of reproduction, comprising the following stages:

- pregnancy phase; the period since weaning until the fecund mating; and the lactation stage;

When established, in average, per unit, the index of using sows is expressed through the proportion:

$$Ius = \frac{nf}{ns}$$

nf = total number of farrowing registered within a year;

ns = average number of sows fed in the respective year;

The index of using sows is considered good when it has the value 2 and very good when comprised between 2.3 and 2.5.

The data referring to the values of the index of use of Landrace x Yorkshire cross bred sows is presented in table 2.

Table 2 Index of using Landrace x Yorkshire cross bred sows

Batch	Reproduction indicators (days)			Index of using sows (%)
	Average period for preparing the mating and the mating itself	Average period of pregnancy	Average period of lactation	
L1	7	115	30	2.40
L2	9	115	30	2.37
L3	10	115	30	2.35

Analyzing the data presented in table 2, one can notice that the highest value has been registered in the batch L1 (5 heads in a pen) 2.40%, followed by the batch L2 (10 heads in a pen) 2.37 and by the batch L3 (15 heads in a pen) 2.35%.

The obtained values can be considered good if they are within the limits presented in the specialty literature for this parameter.

**3. Prolificacy of Landrace x Yorkshire cross bred sows depending on season**

The capacity of reproduction in swine is appreciated through prolificacy, which also supposes applying and respecting a complex of activities and measures, some of them depending on the animal and the other that

are related to ensuring the environment conditions, ending with the number and quality of weaned piglets during a production year. As the number of weaned piglets increases and is of good quality, the fertility is better. Therefore, there is not enough that the sow possesses high fecundity and prolificacy, if not accompanied by a high capacity of lactation, mother’s care of piglets and the concern of the human being to eliminate the events could cause the mortality of products in the periods before and after-birth until weaning.

The data regarding the prolificacy of L x Y cross bred sows depending on season is presented in table 3.

Table 3 Average prolificacy of L x Y cross bred sows depending on season

Season	Batch	Piglets farrowed alive		Piglets farrowed alive (head)	Total of farrowed piglets (head)	Weaned piglets (head)	% weaned piglets from farrowed piglets
		Viable (head)	Unviable (head)				
Winter	L1	13.6	0.3	0.7	14.6	13.2	90.41
	L2	13.5	0.4	0.6	14.5	13.1	90.34
	L3	13.5	0.5	0.4	14.4	13.0	90.27
Spring	L1	14.1	0.3	0.5	14.9	13.6	91.27
	L2	14.0	0.2	0.5	14.7	13.4	91.15
	L3	13.8	0.3	0.5	14.6	13.2	90.41
Summer	L1	13.3	0.3	0.8	14.4	12.9	89.58
	L2	13.6	0.2	0.5	14.3	12.8	89.51
	L3	13.2	0.3	0.6	14.1	12.6	89.36
Autumn	L1	13.5	0.2	0.8	14.5	13.1	90.34
	L2	13.5	0.2	0.6	14.3	12.9	90.20
	L3	13.4	0.3	0.6	14.2	12.7	89.43
Annual average	L1	<b>13.62</b>	<b>0.27</b>	<b>0.70</b>	<b>14.6</b>	<b>13.2</b>	<b>90.40</b>
	L2	<b>13.60</b>	<b>0.25</b>	<b>0.55</b>	<b>14.4</b>	<b>13.0</b>	<b>90.26</b>
	L3	<b>13.57</b>	<b>0.35</b>	<b>0.57</b>	<b>14.3</b>	<b>12.8</b>	<b>89.86</b>

Watching the evolution of the reproductive parameter „prolificacy”, one can state that within the studied batch of sows, as a proof of the fact that the season of mating has an influence upon the prolificacy.

Studying the data presented in table 3, one can state the fact that the number of farrowed piglets has been close in the four seasons, at the three studied batches, being situated between 14.1 and 14.9 piglets per farrowing, resulting the fact that, in the conditions of the intensive breeding when there are ensured the conditions provided by the technology of breeding and exploitation, the season influences in a more reduced percentage the prolificacy of sows.

The higher number of farrowed piglets has been obtained at the 3 batches of sows, in the spring season, and the lowest percentage in the summer season. The possible causes that lead to getting these results can be the ancestral reminiscence inherited from the wild pig, when the farrowing took place in the springs, and for the summer, the excessive heat superposes with the pregnancy, leading therefore to getting lower results.

Also, there is noticed that the highest average number of farrowed piglets has been realized by the batch L1, where the sows have been bred 5 in a stall. Expressed in an absolute

value, the difference unto the batch with the most reduced prolificacy, respectively the batch L3, has been of 2 % (0.3 animals).

As of the number of piglets farrowed dead, we notice reduced values in all the batches situated between -.4 and 0.8 piglets per farrowing, data that complies with the information provided by the specialty literature for this parameter.

Moreover, the high percentage of weaned piglets from farrowed piglets, of about 90% in all the batches, fact which proves the excellent potential of good mothers of the Landrace x Yorkshire cross bred sows, as well as the very good technology practiced in the unit.

#### 4. Prolificacy of Landrace x Yorkshire cross bred sows according to the number of farrowing

Among the productive characteristics of swine, prolificacy occupies an important place because the number of farrowed piglets depends, first of all, on the number of weaned piglets and implicitly on the number of piglets for fattening and flesh delivery, as well as the economic efficiency.

The age of sows can affect the prolificacy in the sense that sows over 3,5 years have declining reproductive indicator and the young one are not fully prepared from the physiological point of view.

Table 4 Reproduction performances of Landrace x Yorkshire cross bred sows according to the number of farrowing

Farrowing	Batch	Piglets farrowed alive		Piglets farrowed dead (head)	Total farrowed piglets (head)	Weaned piglets (head)	% weaned piglets of farrowed piglets
		Viable (head)	Non-viable (head)				
I	L1	13.4	0.3	0.8	14.5	13.1	90.34
	L2	13.5	0.2	0.5	14.2	12.9	90.84
	L3	13.5	0.4	0.5	14.4	12.6	89.58
II	L1	13.5	0.2	0.8	14.5	13.2	91.03
	L2	13.6	0.3	0.4	14.3	12.9	90.20
	L3	13.7	0.3	0.5	14.5	12.9	89.65
III	L1	13.8	0.2	0.7	14.7	13.3	90.47
	L2	13.7	0.2	0.4	14.3	13.1	91.60
	L3	13.8	0.3	0.7	14.8	13.2	88.51
IV	L1	13.8	0.1	0.8	14.7	13.3	90.47
	L2	13.7	0.2	0.7	14.6	13.2	90.41
	L3	13.7	0.3	0.5	14.5	13.0	91.03
V	L1	13.7	0.3	0.7	14.7	13.2	89.79
	L2	13.6	0.2	0.7	14.5	13	89.65
	L3	13.5	0.5	0.6	14.6	12.7	89.04
VI	L1	13.5	0.5	0.5	14.5	13.1	90.34
	L2	13.5	0.4	0.6	14.5	12.9	88.96
	L3	13.2	0.3	0.6	14.1	12.6	91.48
Average per productive life	L1	<b>13.62</b>	<b>0.27</b>	<b>0.70</b>	<b>14.6</b>	<b>13.2</b>	<b>90.40</b>
	L2	<b>13.60</b>	<b>0.25</b>	<b>0.55</b>	<b>14.4</b>	<b>13.0</b>	<b>90.26</b>
	L3	<b>13.57</b>	<b>0.35</b>	<b>0.57</b>	<b>14.3</b>	<b>12.8</b>	<b>89.86</b>

Regarding the prolificacy of sows according to age, the data in the specialty literature indicate that the best reproductive results are obtained at third, fourth and fifth farrowing, irrespective of the breed, that is between the age of 2 and 3 years, but the body weight of animals does not exceed 160 kg.

In table 4 are presented the data regarding the prolificacy of Landrace x Yorkshire cross bred sows according to the number of farrowing.

From the data presented in table 4 it has been noticed that, for all the 3 batches that were analysed, the number of farrowed piglets had an ascending evolution followed by a decrease during the 6 farrowing, the minimum number of piglets farrowed alive being registered at the first farrowing and the maximum number being registered at the third or fourth farrowing.

By analyzing the number of piglets farrowed alive we can notice that it was placed between 13.5 heads and 14.1 heads, values which can be considered very good and which are situated in the references for

this parameter from the specialty literature (Nacu, 2005, McGlone, 2006, Reed, 2000).

The number of piglets obtained for each farrowing is the result of the genetic value of Landrace x Yorkshire cross bred sows, irrespective of the number of sows in the pen, as well as a result of the technology applied in the unit.

The number of non-viable piglets has diminished in all batches being situated between 0.1 and 0.5 heads per farrowing.

The number of piglets farrowed dead was constant in all batches during the whole productive life, being situated between 0.5-0.8 piglets per farrowing.

From the analysis of the data recorded for Landrace x Yorkshire cross bred sows it was noticed that the percentage of weaned piglets out of the total of farrowed piglets is of approximately 90%. The losses of approximately 10% at all the 3 batches - compared to specialty literature (Kelly, 2007, Miller, 2000, Farmer, 1996) which indicates losses for approximately 15% in the moment of weaning - can be attributed to the special

quality of sows as well as to the appropriate exploitation technology during gestation and especially after farrowing and until weaning.

**5. Mortality of piglets during maternity**

In the industrial pig breeding of the last five decades great economic losses have been noticed and mortality has been registered to litter piglets; these losses vary between 5% and 25% of the number of farrowed piglets.

Among the major incriminatory causes the majority is represented by the digestive disorders manifested through diarrhea in the first days of life but also at the age of two-three weeks and immediately after weaning.

The recorded genetic progress has lead to the obtainment of an increasing number of farrowed piglets per sow; although from the technological, medical and nutritional point of view it has been tried to reduce the mortality, the increase of the number of alive piglets did not lead to an increase of weaned piglets, so in the last 25 years only 0.5 weaned piglets per sow per cycle of reproduction have been won.

The mortality registered in the experimental period for the two batches of pigs that were studies is presented in table 5.

Table 5 Mortality registered during maternity at LxY cross-breed

Batch	Percentage of losses / productive life (%)	Average number of dead piglets / sow during maternity period (head)
L 1	9.60	1.4
L 2	9.74	1.4
L 3	10.14	1.5

From the data presented in table 5 we infer the fact that the recorded data for this indicator are situated in the upper limits presented in the specialty literature for this parameter.

The percentage of losses which was effectively recorded during the maternity period at the experimental batches was placed between 9.60% (L3 Batch) and 10.14% (L3 Batch).

Regarding the average number of dead piglets/sow during maternity period, this was almost equal for the 3 batches being placed between 1.4-1.5 heads.

The causes which determined these losses were entailed by:

- crushing/accidents – 30%;
- diarrheic syndrome 30%;
- respiratory syndrome – 30%)
- hypothermia – 5%;
- anaemia, dystrophies – 3%;
- congenital anomalies – 1%
- tail biting – 1%.

**CONCLUSIONS**

1. At the sows studied the fertility was influenced by the number of farrowing on a small scale, the differences that were registered for the 5 monitored farrowing

being rather small regarding the number of farrowed piglets. By comparing the registered fertility values for the 3 batches that were studied, we can notice that the average fertility value is very good of over 90% in all batches (L1 - 92.22%; L2 – 91.66%; L3 – 91.66%), fact which indicates that the Landrace x Yorkshire cross bred sows have special maternal instincts

2. The prolificacy was influenced by the season on a small scale, the best values being obtained for all the batches in the spring seasons and the lowest values in the summer season. We can thus state that, in industrial conditions, when the air-conditioning of the sheds is almost constant during the year, the season influences very little the sows' fecundity.

3. The number of farrowing has influenced the fecundity of the sows studied. Therefore, in all batches, the best results were obtained at the third and fourth farrowing (14.3-14.8 head) and the lowest results at first and sixth farrowing (14.1-14.5 head).

4. The index of using sows for reproduction had very good values for all batches being between 2.35 and 2.40.

5. For the 3 batches the losses of piglets registered until weaning was of

approximately 10% compared to the specialty literature which indicates losses of approximately 10-15% and which can be attributed to the special quality of sows as well as to the appropriate exploitation technology during gestation and especially after farrowing and until weaning.

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