Reproductive performance of sows on farms in Slovenia

Salehar A., Kovac M., Sivic N.

in

Aumaître A. (ed.).
The production of pig meat in Mediterranean Countries

Paris : CIHEAM
Options Méditerranéennes : Série Etudes; n. 1989-I

1989
pages 119-128

Reproductive performance of sows on farms in Slovenia

Andrej SALEHAR
Kardelj University - Biotechnical Faculty
Zootechnical Dept. Ljubljana - Yugoslavia

Milena KOVAC
Agrocombinate "Ihan Domzale" - Ljubljana - Yugoslavia

Niko SIVIC
Agrocombinate Emona "Ihan Domzale" - Ljubljana - Yugoslavia

The extraordinary reproductive potential of domestic pigs holds a special place among the characteristics of these animals. What other domestic mammal has such early sexual maturity, such a short reproductive cycle and such prolificacy? For this reason, reproduction is of great economic importance in pig farming.

There are numerous papers in the literature explaining the different factors and laws of pig reproduction. A knowledge of these factors, as well of physiological and biological laws, enables the breeder to regulate the reproduction process and to attain optimal piglet production. On farms with 1,000 and more sows, other factors are more important and therefore of greater economic weight. A disadvantage of farm rearing is poor individual control over sows in the herd, which has to be substituted by methods of housing and, first of all, by better management. The organization of the entire range of professional work is also extremely important as is the performance of tasks such as heat detection, insemination, detection of returns, pregnancy diagnosis, etc. Control of data on each separate sow and regular and accurate data processing, which together indicate the orientation of papers on the reproduction of sows, are also among the most important professional measures.

The purpose of this paper is, in the first place, to present the results of sow reproduction and piglet production on eight farms in Slovenia with practically the same production and nutrition technology and the same pig breeds (Swedish Landrace, Large White, German Landrace, crosses of Line 12 and, recently, Duroc and Piétrain).

For following the reproduction of sows, they all have comparable documentation which is being treated by a unified procedure on the University computer in Ljubljana. All eight farms combined produce 305,000 fatteners per year and have 1,000-5,500 sows in their herds. This paper presents the results from 1980 on, when the previous analyses were completed by analyses of the reproduction cycle which makes possible a general biological and economical evaluation of reproduction and its changes over the course of years.

I - Gilts

1. Age at the first service and the economic aspect of piglet production with gilts (Table 1).

The data in **Table 1,** where 18,339 first services are analyzed, show the following characteristics:

– up to 240 days of age, *ca.* 60% of gilts are first services and at 300 days and later, *ca.* 5%;

– the share of culled gilts increases with the age at the first service, because of more rigorous culling of older gilts;

– corrected interval from selection to first farrowing increases with age at the first service on account of an increase of the share of unproductive phases - from 19.1% at the age of 210 days at the first service to 66.5% with a group older than 300 days at the first service;

– the age at first farrowing and the number of liveborn piglets per litter increases with age at the first service. The increase of the number of liveborn piglets per litter is not linear and practically ends at an age over 270 days after the first service;

– the number of feeding days per liveborn piglet increases with age at the first service - the lengthening of the corrected interval from selection to first farrowing does not follow the increase of the number of liveborn piglets.

2. Fertility measures with gilts on Slovene farms from 1980 to 1985 (Table 2)

Between 1980-1985 there were 53,517 farrowings of gilts on eight farms in Slovenia. Changes can be observed over the years in the measures regarding the number of feeding days, but there are no changes in the number of liveborn piglets. The shortening of the corrected interval from selection to first farrowing and the increase of the share of productive phase is ascribed to better management. The number of feeding days per liveborn piglet decreased from 24.65 days in 1980 to 21.59 days in 1985, which means 12.4% cheaper piglet production with gilts.

3. Fertility of gilts on farms in 1985 (Table 3)

The data in **Table 3** are arranged so that the number of feeding days per liveborn piglet increases from the first to the last farm. In general, it can be established that in all traits of gilt reproduction there are great differences between farms. On farm B, the majority of gilts are serviced on entering their sexual maturity, which can be seen from the number of liveborn piglets. Data from this farm can be used to confirm the fact that for an evaluation of reproductive performance, and especially of the economic aspect of piglet production, knowledge of prolificacy alone is not nearly sufficient. In this case farm B can be ranked at the last place and not the second one which is evident from the entire calculation. The differences between farms regarding the economic aspect of production are also very significant. On farm D, where the number of feeding days used per piglet was the greatest, piglet production was 36.4% more expensive than on farm A.

II - Reproductive performance of sows according to the litter number

For the analysis of reproductive performance of sows according to litter number, data from 143,814 reproduction cycles were used. Except for generally known laws on certain changes in the size and composition of litters, the above presentation also makes obvious the following, usually not demonstrated, statements:

– as for the litter size, equal variations are also shown by the farrowing rate and the share of repeated farrowings,

– with primiparous sows, all known problems connected with returns are indicated in a minor share of repeated farrowings,

– the farrowing to culling interval also decreases with litter number,

– the corrected farrowing interval decreases up to the fifth litter, and from there on it increases. Another law of variation can be seen in the number of feeding days per liveborn piglet, which, exceeds this number with gilts after ten successive farrowings.

III - Sows

1. Reproductive performance of sows between 1980-1985

While evaluating data from **Table 4,** the following can generally be established, similarly as with gilts: the traits connected with the number of feeding days show greater variations between years, and the number of liveborn piglets smaller ones. The mean lactation length is 3.5 weeks, which indicates an intensive utilization of sows. The share of productive phases, which is generally greater with sows than with gilts, is increasing while the corrected farrowing interval has been declining since 1980. Both traits are under the influence of the duration of the farrowing to culling interval and of the share of the culled sows between two farrowings. For the calculation of the

number of litters and of the number of liveborn piglets per sow and year, the numeric status of sows has been taken into account. As with the number of feeding days per liveborn piglets, the changes between years are smaller, but generally piglet production is cheaper with sows than with gilts.

2. Reproductive performance of sows according to farms in 1985 (Table 5)

The differences in the reproductive performance of old sows between farms are relatively important. The following traits are most important in this respect: the share of repeated farrowings which varies from 69.6% to 83.0%; the corrected farrowing interval (from 168.6 days to 199 days); the share of unproductive phases (from 18.2% to 29.7%); the number of litters per sow per year (from 1.83 to 2.17); and the number of liveborn piglets per sow per year (from 17.9 to 20.65). These influence the economic aspects of the production of liveborn piglets which can also be seen in the differences in the number of feeding days per liveborn piglet. It varies from 17.7 days on farms A and B to 20.4 days on farm E where piglet production is 15.2% more expensive than on the previous farms.

3. Primiparous sows (Table 6)

The problems of reproduction of primiparous sows are well known. Our presentation also shows a low share of repeated farrowing. The loss with primiparous sows influences directly and indirectly the economic aspects of piglet production; directly by the greater number of feeding days per liveborn piglet, and indirectly by the change in the age structure of the herd where the share of "the best farrowings" has been reduced.

Besides the fertility measures that are presented, it should be mentioned that the share of repeated farrowings with primiparous sows has a negative relationship with the age of gilts at farrowing. This is another reason for early service of gilts.

4. Lactation length (Table 7)

In evaluating the data from **Table 7**, it must be taken into account that the data on lactations for 0-14 days and for 35 days and more, are only informative. Weanings before the 14th day are premature, because of sow illness, small litters, shortage of milk or similar reasons. Weanings after 35 days are due to giving weak piglets to foster mothers. They indicate certain interesting things which justify their mentioning.

For evaluation of the length of lactation and its influence, and thus also the intensity of the utilization of sows, data about the length of lactation between 15 and 34 days are given. Almost 90% of sows are weaned between the 3rd and 4th weeks after farrowing and only 10% in all other lengths of lactation. From the data in **Table 8,** all well known influences on the duration of lactation on separate measures of fertility are obvious. It should be mentioned again that as with the length of lactation, the share of repeated farrowings, the number of liveborn piglets, the farrowing rate, and the farrowing interval are increased. The cheapest piglets are those with lactations between 20 and 24 days. The small differences in the number of feeding days per liveborn piglet with lactations between 15 and 19 days and 25 and more days should be noted.

5. Seasonal effects (Figure 1)

Seasonal effects on the reproductive performance of sows can be observed in all places where there are greater increases in temperature in the summer and where there are considerable changes in the length of day. These influences are also present on our farms and are presented here by an example of farrowing rate with old sows on two farms in 1980-1985.

In summer, farrowing rates are considerably smaller. These variations are especially pronounced on farm A which is the only one with yards for sows from weaning to farrowing. On large farms the continuity of production is the basic condition for its optimal functioning. Knowledge of different influences can help in adjusting the production.

IV - Longevity and life performance of sows

1. Number of litters and liveborn piglets per sow (Table 8)

Somewhat less than one third of sows give only one litter, one fifth give 2-3, one fifth 4-6, one fifth 7-9, and only one tenth of sows give more than 9 litters. On average, sows give 4.98 litters or 48.3 liveborn piglets. The longevity of sows directly

affects the economic aspects of piglet production and the replacement rate.

2. Longevity of sows - comparison between farms (Table 9)

V - Litter size at weaning and losses of piglets (Table 10)

Every tenth piglet is lost between farrowing and weaning, which can be estimated as a good result. There are greater changes between years in the share of losses and smaller ones in the number of weaned piglets. The number of feeding days per weaned piglet has decreased since 1980 and the production of weaned piglets in 1985 has become cheaper by 60%. This means a total saving of 428,984 feeding days.

VI - Conclusions

Reproductive performance was studied between 1980 and 1985 on eight pig farms in Slovenia with a total annual production of 305,000 fatteners and with 1,000 - 5,000 sows in herds. An analysis of 53,517 farrowings of gilts and 146,966 farrowings of sows showed the following results:

a) The mean age of gilts at their first service is 246.2 days, the age at the first farrowing 365.8 days, the number of liveborn piglets 8.63, the share of productive phases 58.9%, the corrected interval from selection to first farrowing 193.8 days, and the number of feeding days per liveborn piglet 22.4 days. There are great differences between farms in the reproductive performance of gilts.

b) The number of feeding days per liveborn piglet and the share of gilts culled after service increase with age at the first service. The growth of the number of liveborn piglets with age of gilts is not linear and practically ends with ages above 270 days at the first service.

c) After successive farrowings, the farrowing rates and share of repeated farrowings change in accordance with the known changing of the size and composition of litter. Up to the fifth litter the corrected farrowing interval and the number of feeding days per liveborn piglet decreased; with higher farrowings, they increased.

d) The mean farrowing interval with sows is 155.5 days, the corrected farrowing interval 180 days, the lactation length 24 days, the share of productive phases 77.1%, the number of liveborn piglets 9.58, and the number of feeding days per liveborn piglet 18.8 days. There are great differences between farms in the reproductive performance of sows. With primiparous sows, the reproductive performance is worse and thus the costs of piglet production are greater.

e) The majority of sows (90%) have a three to four week lactation period. The smallest number of feeding days per liveborn piglet occurs with the lactation lengths between 20 and 24 days.

f) With summer temperatures, considerable seasonal effects are present on almost all farms and cause, among other things, a reduction in the farrowing rate with sows.

g) On average, sows have 4.98 litters and produce 48.3 liveborn piglets. As for sow longevity, there are great differences between farms.

h) The rate of losses of liveborn piglets from birth to weaning is 11.3%, the number of weaned piglets 8.3, and the number of feeding days per weaned piglet 21.1 days. Between 1980-1985 the number of feeding days per weaned piglet decreased by 6% and thus saved in 1985, 428,984 feeding days.

Table 1: Fertility measures of gilts by age at first service

Age at first service (days)		Up to 210	211-240	241-270	271-300	301 and more	Total
No. of first services	(n)	2,635	7,983	4,576	2,210	935	18,339
	(%)	14.37	43.53	24.95	12.05	5.10	-
Share of culled gilts	(%)	2.2	14.6	16.3	20.9	25.4	14.6
Selection to first service interval	(days)	8.2	28.9	57.9	85.8	140.5	44.9
Corrected interval from selection to first farrowing	(days)	140.9	168.1	207.3	249.4	340.7	189.9
Productive phase	(days)	80.9	67.8	55.0	45.7	33.5	60.0
Unproductive phases	(%)	19.1	32.2	45.0	53.3	66.5	40.0
Liveborn piglets	(%)	8.37	8.69	8.97	9.05	9.07	8.76
FD/Liveborn piglet*	(head)	16.84	19.34	23.11	27.55	37.56	21.67

* FD: feeding days

Table 2: Fertility measures with gilts on Slovene farms from 1980 to 1985

Years	1980	1981	1982	1983	1984	1985	Total
N° of farrowings	7,525	10,662	9,015	9,010	8,397	8,908	53,517
Age at 1st service (days)	249.3	252.9	245.1	243.9	243.0	242.0	246.2
Age at 1st farrowing (days)	369.8	374.1	368.1	361.7	360.3	359.4	365.8
Corrected interval from selection to 1st farrowing (days)	212.2	196.6	192.1	189.5	186.9	186.3	193.8
Productive phase (%)	53.7	57.7	59.3	60.2	61.0	61.2	58.9
Unproductive phase	46.3	43.3	40.7	39.8	39.0	38.8	41.1
Liveborn piglets	8.6	8.6	8.6	8.7	8.7	8.6	8.6
FD/liveborn piglets (days)	24.6	23.0	22.3	21.8	21.6	21.6	22.4
Comparison with 1980 FD (1980) = 100%	100.0	93.3	90.4	88.4	87.5	87.6	

Table 3: Fertility measures with gilts on five farms in Slovenia in 1985

Farm	A	B	C	D	E
N° of farrowings	1,422	657	1,968	740	2,579
Age at first service (days)	215.2	224.9	237.3	253.0	257.6
Age at farrowing (days)	333.2	342.4	334.3	371.5	374.8
Corrected interval from selection to 1st farrowing (days)	146.3	161.8	182.4	209.4	205.8
Productive phase (%)	77.9	70.5	62.5	54.4	55.4
Unproductive phase (%)	22.1	29.5	37.5	45.6	44.6
Liveborn piglets	8.4	8.1	8.6	9.2	8.7
FD/liveborn piglets (days)	17.3	20.0	21.2	22.8	23.7
Comparison of FD (farm A = 100%)	100.0	115.5	122.4	131.7	136.4

Table 4: Reproductive performance of sows on pig farms in Slovenia between 1980-1985

Years	1980	1981	1982	1983	1984	1985	Total
No. of farrowings	12,685	19,29	24,428	28,681	31,400	30,470	146,957
Share of repeated farrowings (%)	80.5	78.1	78.5	81.0	79.6	78.5	79.3
Lactation length (days)	22.5	24.0	24.2	23.8	24.1	24.6	24.0
Farrowing interval (days)	158.0	159.7	156.3	154.0	154.2	153.8	155.5
Corrected farrowing interval (days)	182.5	190.4	180.5	174.8	177.4	179.5	180.0
Productive phase (%)	75.2	73.7	76.8	79.3	78.2	77.3	77.1
Unproductive phase (%)	24.8	26.3	23.2	20.7	21.8	22.7	22.9
Liveborn piglets	9.6	9.5	9.5	9.6	9.6	9.7	9.6
No. of litters/sow/year	2.0	1.9	2.0	2.1	2.1	2.0	2.0
No. of liveborn piglet/sow/year	19.2	18.2	19.4	20.0	19.8	19.6	19.5
FD/liveborn piglets (days)	19.0	20.1	18.8	18.3	18.4	18.6	18.8

Table 5: Reproductive performance of sows on five farms in Slovenia in 1985

Farm	A	B	C	D	E
No. of farrowings	8,343	3,093	4,323	9,836	2,506
Share of repeated farrowings (%)	80.4	83.0	74.2	79.6	69.6
Lactation length (days)	23.8	23.7	23.4	25.0	25.7
Farrowings interval (days)	154.0	150.4	152.1	154.7	153.5
Corrected farrowing interval (days)	175.2	168.6	177.6	180.7	199.1
Productive phases (%)	78.9	81.8	77.5	77.0	70.3
Unproductive phases (%)	21.2	18.2	21.5	23.0	29.7
Liveborn piglets	9.9	9.5	9.7	9.3	9.8
No. of litters/sow/year	2.1	2.2	2.0	2.0	1.8
No. of liveborn piglet/sow/year	20.6	20.6	20.0	18.9	17.9
FD/liveborn piglet (days)	17.7	17.7	18.3	19.4	20.4

Table 6: Reproductive performance of primiparous sows on four farms in Slovenia in 1985

Farm	A	B	C	D
No. of farrowings	1,548	406	1,116	1,617
Share of repeated farrowings (%)	74.5	74.6	75.9	72.9
Lactation length (days)	22.6	24.2	23.4	24.6
Farrowings interval (days)	160.7	163.3	156.2	169.5
Corrected farrowing interval (days)	193.5	197.1	183.7	212.8
Productive phases (%)	71.1	70.6	75.3	65.6
Unproductive phases (%)	28.9	29.4	24.7	34.4
Liveborn piglets	9.6	8.9	9.4	9.1
FD/liveborn piglet (days)	20.1	22.2	19.6	23.3

Table 7: Analysis of the fertility of sows with regard to the lactation length on farms in Slovenia

Lactation from - to days	Animal at the beginning of the reprod. cycle		Weaning to 1st service interval (days)	Weaning to conception interval (days)	Share of repeated farrowings (%)	Farrowing interval (days)	Liveborn piglets	Farrowing to culling interval (days)	Corrected farrowing interval (days)	FD/ liveborn piglet (days)
	n	%								
0-4	3,431	2.4	32.6	40.9	36.8	156.3	9.23	43.8	231.6	25.09
5-9	789	0.6	19.5	29.8	45.6	149.8	8.29	38.3	198.5	23.94
10-14	480	0.3	16.0	26.5	47.9	149.1	9.49	41.6	191.8	20.21
15-19	5,825	4.1	10.7	23.6	79.7	148.6	9.42	78.9	171.5	18.20
20-24	79,030	55.2	10.1	20.2	81.2	152.1	9.56	90.8	173.1	18.11
25-29	46,568	32.5	11.3	23.0	82.4	156.7	9.71	104.7	179.1	18.44
30-34	3,459	2.4	12.1	22.9	84.0	162.3	9.97	116.2	184.3	18.49
35 and more	3,581	2.5	10.8	24.1	84.7	173.7	10.60	122.6	195.9	18.48

Table 8: Average number of litters and liveborn piglets per sow

No. of litters per sow	Share of sows (%)	Share of culled sows (%)
1	27.2	27.2
2-3	20.7	47.9
4-6	21.1	68.0
7-9	18.0	87.0
10-11	9.0	96.0
12 and more	4.0	100.0

Number of culled sows: 12,621; Number of litters per sow: 4.98; Number of liveborn piglets per sow: 48.3

Table 9: Longevity and life performance - comparison between farms

Farm	A	B	C	D
No. of sows	1,732	3,847	6,287	755
Culling rate between two farrowings (%)	17.9	22.4	21.5	18.2
Share of sows with no. of litters (%)				
1	27.7	20.0	31.7	21.9
2-3	16.2	26.0	19.8	15.5
4-6	17.9	23.7	20.3	21.5
7-9	15.6	20.1	15.8	30.1
10 and more	22.6	10.2	12.4	11.0
Mean number of litters per sow	5.77	4.91	4.73	5.57
Mean number of liveborn piglets per sow	54.5	47.2	46.5	54.5

Table 10: Litter size at birth and weaning and losses of piglets on pig farms in Slovenia in 1980-1985

Year	No. of farrowings	Liveborn piglets	FD/liveborn piglet (days)	Weaned piglets	Share of losses (%)	FD/weaned piglet (days)	Comparison of FD (year 1980 = 100%)
1980	17,310	9.31	20.4	8.3	10.9	22.9	100,0
1981	27,471	9.22	20.9	8.3	10.1	23.3	101.6
1982	32,622	9.30	19.6	8.2	11.6	22.2	96.9
1983	37,687	9.35	19.1	8.2	12.2	21.7	94.8
1984	39,806	9.42	19.0	8.3	11.8	21.6	94.3
1985	39,378	9.43	19.2	8.4	11.1	21.6	94.3

Figure 1: Seasonal effect on farrowing rate with sows