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Izvorni znanstveni članak

Original scientific paper

MONITORING OF THE PIGLETS LOSSES IN INTENSIVE SWINE PRODUCTION

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Summary

The causes of losses of suckling pigs from a large swine farm were investigated and classified on the basis of monthly pathomorphological examination in the period from June 1985 to May 1988.

The most common losses in the preweaning period were due to stillbirth overlaying/crushing, culling (technological waste), and diseases among which gastrointestinal syndrome (GIS) was predominant. The other diseases (pneumonia, edema disease, congenital abnormalities) made a minor impact on the total mortality rate and were excluded from the study.

An average of 29.4% of all losses were prepartiurent deaths ranging from 26.6% in December to 32.2% in October. A similar average of 28.8% pigs died of crushing. The lowest incidence of crusing was also observed in December (25.8%); the higest was recorded in August (32.7%). Of total losses 14.1% were due to culling with the minimum in November (11.4%) and the maximum in December (18.5%). Of those pigs that died of GIS, the lowest occurrence was recorded in October (14%) and the highest in November (24.7%), with an average of 18.9% for the three-year-period of observation. By sistematicaly collecting data on current pathology during that period and applying computer-assisted program for the third degree trend curve we calculated the tendency of the proportion of monitored categories of losses in the total loss of pigs. Based on the trends curve for empiric (observed) losses with the lowest aberration from those for theoretical (expected) losses we were able to predict the tendency of each category of losses on a large swine farm for a perod of another three years. However, the significant changes in housing, management or technology of production, and outbreaks of diseases should be considered before any firm conclusions are made.

Introduction

In the intensive swine production a certain number of pigs differing in age are culled or die because of considerable alterations in their health status. Thus, it is or great importance to observe sistematically current pathology and losses due to diseases of other causes among swine from large (industrial) of small farms. The only moni-

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toring study of swine losses and their causes that is organized and performed on daily basis can be of practical value for timely prevention of diseases and effective control of infections on a large intensive piggery.

Several authors have indicated that preweaning mortality is a significant cause of loss in the swine industry. Ilančić et al. (1968) have reported losses, at the rate of 14. 53%, up to six weeks of life among liveborn pigs (crossbreds of Swedish and Dutch Landrace and Yorkshire) from 1099 litters. The overall preweaning mortality rate of 24.15% observed in the field investigatins in Slovenia (Böhm et al., 1971) indicate that the level of mortality is much higher than in most countries, because of the high occurrence of stillborn pigs (5.85%). The mortality rate among liveborn pigs due to crushing (3.96%), and infections (9.0%) or pigs culled because of low birth weight of congenital abnormalities (2.12%) are equal to those in most countries. Of total losses recorded among suckling pigs on a large swine farm in Bosnia and Hercegovina (Vrbanac et al., 1973) 33.57% were due to diseases and 46.9% were caused by noninfectious conditions and 19,5% were stilborn pigs. The latter were sudbivided into 5 groups based on the first defect observed, i.e. 45.75% crushed, 39.40% culled as technological waste, 8.03% small weight, 5,14% congenital abnormalities such as paralysis / paresis, and 1.66% atresio ani. Preweaning diarrheal disease (or gastrointestinal syndrome = GIS) is also one of the fatal causes of mortality among neonatal pigs which accounts for 59.38% losses in the first 7 days after birth. (Vrbanac et al., 1977).

Similar findings were reported by Msolia and Singh (1986) who monitored 41 parturitions and recorded an average of 55.2% lost sucklings within 3 days of life. The mortality rate increased with the litter size. This was also confirmed for increased number of stillborns from sows with litters of 12 or more pigs on 5 farms in Minnesota, USA by Blackwell in 1987. He suggested that it might be possible to predict (and eventually avoid) an increase in the number of stillborn pigs by analyzing the previous parturitions of such sows.

Permissible economic losses in swine industry average 20% of the total of farrowed pigs, with rates of 4 to 6 % for stillborns, 9 to 13 % for liveborns, and an average mortality rate ranging from 16 to 24 % for sucklings. (Sviben, 1976).

We assume that it is possible to predict the frequency of swine losses regarding cause of death and the trend of mortality during shorter or longer period of time based on the data collected from necropsies taking into account the first defect (factor) predisposing to death. Our assumption was tested in a survey reported herein in which we have studied: (1) the most common losses among swine raised in intensive production, (2) the rate and structure of losses, and (3) possible regularity of the phenomenon of losses caused by imperfections of technology or infectious diseases.

Material and methods

The study was conducted on a large intensive swine farm in Bosnia and Hercegovina from June 1985 to May 1988.

Population studied

The sows and gilts were a cross betwen Swedish Landrace (particularly gilts) and a Large White boar.

The farm was built in 1967, and contained reproductive pens, farrowing houses (from birth to weaning at three weeks of age) rearing units (from weaning to 25 kg of body weight), and prefattening / fattening units (pigs up to 105 kg of body weight). The investigations were performed in all farrowing houses.

Pathological examination

All pigs that died at birth or before weaning were necropsied, usually within 6 hours of death. The pathomorphological findings of the farm veterinarian (of pathologist from the research team) were recorded on a standard form for the results of necropsy.

Diagnostic criteria

The cause of death of each pig was determined using both clinical history and post-mortem data as well as the experiances of causes of preweaning mortality during a few years of preliminary investigations on the farm. Each death was classified acording to the gross pathology finding of ultimate cause of death into a category of losses according to worldwide accepted criteria.

The data were analyzed using statistic al tests of Snedecor and Cochran (1967) and Serdar (1960).

Results

Data on production and mortality in farrowing houses are presented in Table 1.

Tab. 1 - PRODUCTION AND MORTALITY DURING A THREE-YEAR-PERIOD (1985-1988) IN SUCKLING PIGS ON A LARGE SWINE FARM

Parameter	1985/86	1986/87	1987/88
No. of litter per year	11995	10806	11847
No. of pigs born alive	115052	104773	113547
Average no. of liveborns per litter	9.6	9.7	9.6
No. of weaned pigs per month	99530	89996	94818
Average no. of weaned pigs per litter	8.3	8.3	8.0

The prevalence of the different causes of preweaning losses are given in Table 2.

Tab. 2 - STRUCTURE OF PREWEANING LOSSES AMONG PIGS ON A LARGE SWINE FARM DURING A THREE-YEAR-PERIOD (1985-88)

Parameter	Total	% of total pigs born
Born dead	20682	5.8
Born alive	333372	94.2
Weaned	284314	85.3
Died during suckling period	49058	14.8
Lost birth to weaning	69740	19.69

Of total losses we base analyzed the categories that were recorded with the highest mortality rate such as stillborn, crushed and culled pigs (Figure 1), and those that died of diseases. In the latter category particular attention was given to the pigs that died of GIS (Figure 2) while the other causes of death were observed only in a low percentage with regard to total losses among sucklings.

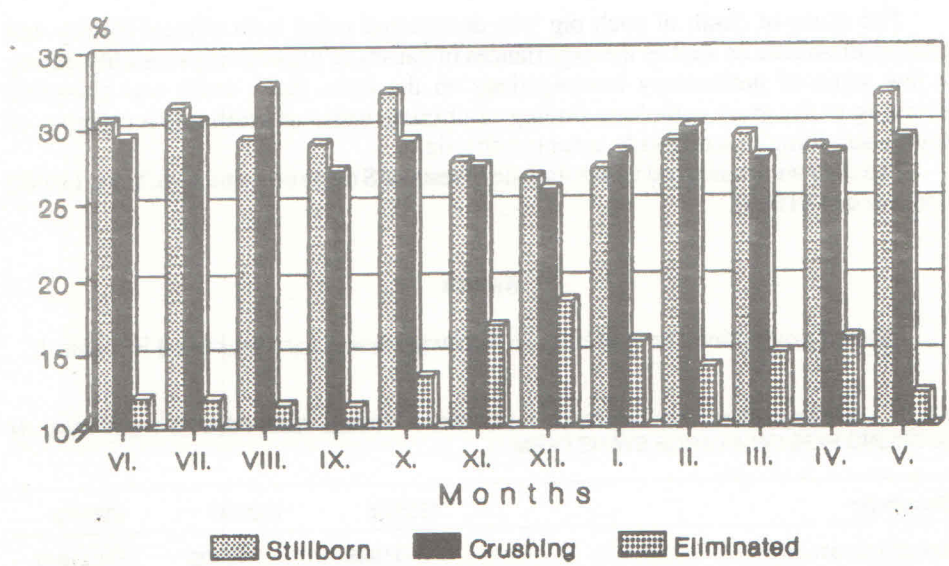

Fig. 1. THE AVERAGE MONTHLY LOSSES DUE TO STILLBIRTHS, CRUSHING, AND CULLING (PIGS ELIMINATED AS TECHNOLOGICAL WASTE) OF TOTAL LOSSES AMONG SUCKLING PIGS FROM A LARGE INTENSIVE SWINE FARM DURING A THREE-YEAR-PERIOD.

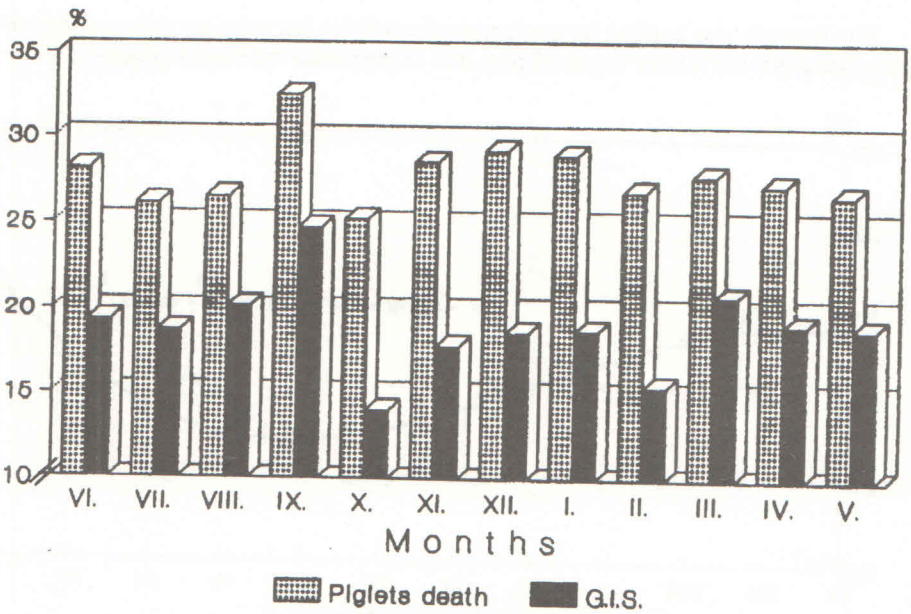

Fig. 2. THE PERCENTAGE OF MONTHLY LOSSES DUE TO GIS IN TOTAL LOSSES AMONG SUCKLING PIGS FROM A LARGE INTENSIVE SWINE FARM DURING THREE-YEAR-PERIOD

Nearly 30% (an average of 29.6%) of all losses were preparturient deaths with the lowest incidence in December (1412 stillborns or 26.6%) and the highest in October (1942 or 32.2%) (Figure 1).

Similar proportion of losses due to crushing (an average 29% of with the lowest incidence of 1371 or 25.8% crushed pigs in December) was observed. The peak of deaths due to crushing (2165 or 32.7%) was recorded in August (Figure 1). An average of 14.1% culled pigs (Figure 1) ranged from 11.4% (742 pigs in November) to 18.5% (of 985 pigs in December).

Of those pigs that died of GIS, the lowest incidence was observed in October (845 or 14%) and the highest in November (1610 or 24.7%) with an average of 18.8% for a three-year-period (Figure 2). The other causes of death due to pneumonia, apoplexia cordis, atresio ani, inanitio neonatorum and edema were found to be present in a very low percentages and, thus were excluded from this study.

The obtained data during a three-year-period were also presented as tendency for the proportion of given category of losses in a total loss of pigs.

According to the available data we were able to present the tendency of monthly percentage share of stilborn pigs in the course of a three year perid. The smailest deviation sum of squares of the original data from the theoretical one was the third degree curve presentet by the equation

$$Yc = 30.12 + 0.77\ x - 0.29\ x^2 + 0.019\ x^3$$

The formula was applied for presenting the relation between empiric and theoretical (calculated) curves for losses of pigs due to prepartiurent deaths (Figure 3).

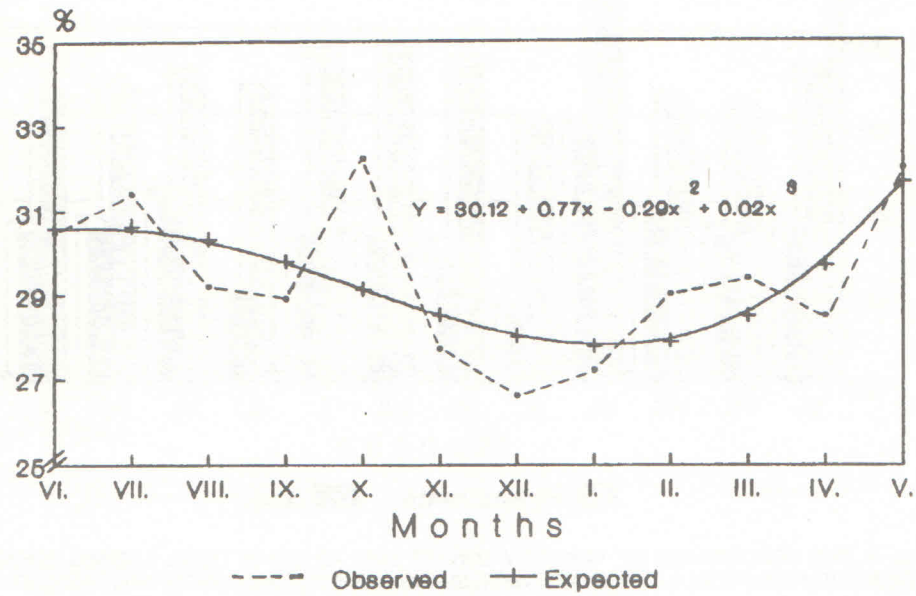

Fig. 3. THE TREND CURVE FOR EXPECTED (THEORETICAL) PROPORTION OF STILLBORNS AS CALCULATED FROM THE OBSERVED (EMPIRIC) PROPORTION OF PIGS THAT DIED AT BIRTH DURING A THREE-YEAR-PERIOD

As for losses due to crushing the trend was also calculated using the following formula:

$$Yc = 30.74 - 0.18\ x - 0.09\ x^2 - 0.008\ x^3$$

and the empiric versus theoretical trend curves were presented in Figure 4.

For losses due to GIS in the relation to total losses the calculated formula was as follows:

$$Yc = 18.92 + 0.82\ x - 0.23\ x^2 - 0.01\ x^3$$

and the empiric compared to theoretical trend curves were shown in Figure 5.

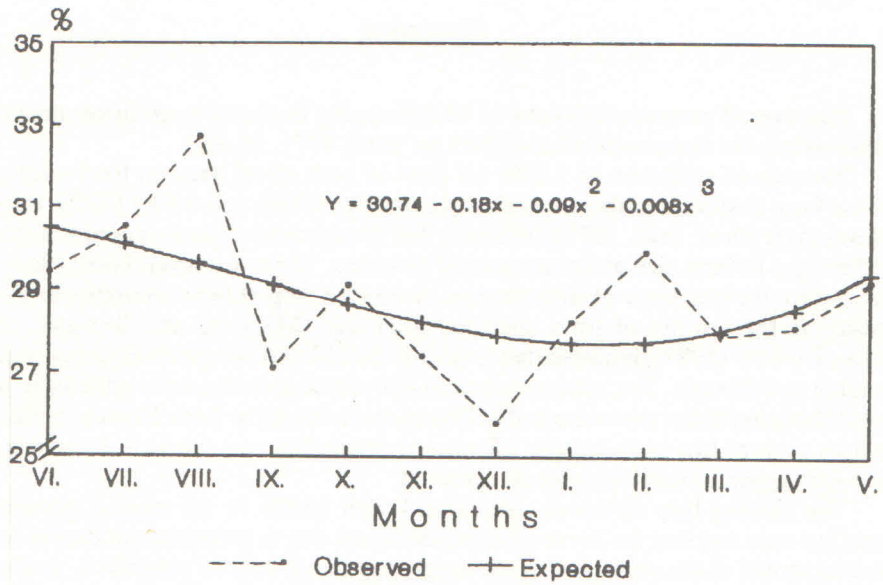

Fig. 4. THE TREND CURVE FOR EXPECTED (THEORETICAL) PROPORTION OF CRUSHED PIGS AS CALCULATED FROM THE OBSERVED (EMPIRIC) PROPORTION OF PIGS THAT DIED DUE TO CRUSHING DURING A THREE-YEAR- PERIOD

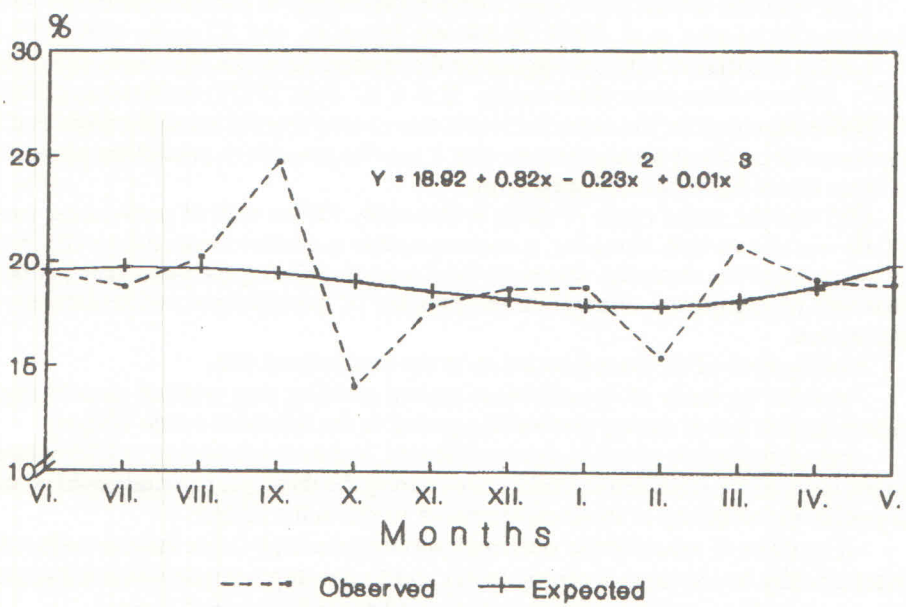

Fig. 5. THE TREND CURVE FOR EXPECTED (THEORETICAL) PROPORTION OF LOSSES DUE TO GIS AS CALCULATED FROM THE OBSERVED (EMPIRIC) PROPORITON OF PIGS THAT DIED FROM GIS DURING A THREE-YEAR-PERIOD

Discussion

The overall preweaning losses of 14.8% among liveborns were lower than those observed on the farms in Slovenia (B ö h m et al., 1971, 16.4%).

The rate of stillborns of 5.85% (of total of born alive) seen on the investigated swine farm is similar to those reported previously (5.84% and 4-6%) for the farms in Slovenia (B ö h m et al., 1971) indicating that this amount of losses is common despite differences in farm size and management practices. There are several possible explanations for the incidence of stillborn pigs. Increased prepartuirent mortality is directly related to the fertility of sows and their litter size (M s o l i a and S i n g h, 1986). B l a c k w e l l (1987) proposed that large litters of 12 or more pigs were a major factor leading to stillborns. The author suggested that attention to the sows with large litters would help to predict occurrence of stillborns on an intensive farm. However, the other factors such as low birth weight, increased interpig interval, hypoxia or anoxia, and low pig vigour at birth may also be involved.

The finding that stillborns participated with 29.6% in the overall preweaning mortlity rate, and that the curve of expected losses due to preparturient deaths is very similar to that of the observed losses, suggesting that it may be possible to predict the trend of stillbirths during a period of three years. Howerver, the prepartiurent deaths associated with the mycotoxins and other toxins in the feed of infectious diseases should also be considered.

Low viability and cachexia were found to predispose to perinatal mortality due to crushing (V r b a n a c et al., 1977, 50.3% and M s o l i a and S i n g h, 1986, 55%).

Deaths associated with overlaying on the studied farm (28.9%) were nonsignificantly different from those observed by B ö h n et al. (1971) in Slovenia (26.6).

Since the curve for the expected losses due to crushing did not differ from that for the observed crushing we also assume that it may be possible to predict the proportion of these losses for the investigated farm.

GIS was the major cause of death in this study. Of the total of preweaning losses 18.9% was due to GIS. However, it seems possible to predict losses due to GIS based on the curve of the expected versus obseved mortality during the three year-period, if there are no significant changes in the housing or management and technology of production.

Examination of all the results led us to the conclusions that:

- monitoring study of overall losses among suckling pigs enabled quantifying of most common losses during preweaning period in the intensive swine industry;
- calculated trends of losses due to stillbirths, overlaying/crushing or GIS obtained on the basis of the observed mortality rates during the three-year-period could be used to predict the tendency of these categories of losses in the future;
- it could be of value for the veterinary service on a large swine farm to collect data sistematically on the most common losses and to develop computer-assisted surveillance system for prevention of technopaties and providing disease control.

Acknowledgments

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SUSTAVNO PRAĆENJE GUBITAKA ODOJAKA U INTEZIVNOJ SVINJOGOJSKOJ PROIZVODNJI

Sažetak

S razvojem intezivne svinjogojske proizvodnje uočeno je da određeni broj svinja različitih uzrasnih kategorija ugiba ili se zbog poremećenog zdravlja izlučuje. Zbog toga je od najveće važnosti utvrditi razloge uginuća ili izlučenja odojaka kao i njihovo sustavno praćenje.

Istraženi su u farmskoj proizvodnji svinja najučestaliji gubici odojaka, njihov udio, te moguće zakonitosti u pojavi gubitaka. Gubici su lučeni na one koji su nastali kao posljedica procesa proizvodnje i na one koji su uzrok bolesti. Gubici odojaka po unapreijed određenim kategorijama praćeni su po mjesecima u godini u razdoblju od lipnja 1985. do svibnja 1988. godine.

U odnosu na ukupne gubitke u prasilištima praćena je mrtvorođena, prignječena, izlučena prasad, te prasad koja je uginula uslijed najčešće bolesti gastrointestinalnog sindroma (GIS). Utvrđeno je da je udio mrtvorođene prasadi varirao po mjesecima u godini od 26.6% do 32,2%, prignječene prasadi od 25,8% do 32,7%, izlučene prasadi od 11,4% do 18,4%, a udio uginuća odojaka od gastrointestinalnog sindroma od 14,0% do 20,8%.

Podaci s kojima se raspolagalo omogućili su prikazivanje tendencije kretanja postotnog udjela mrtvorođene, izlučene te uginule prasadi od gastrointestinalnog sindroma po mjesecima u godini.

Najmanja suma odstupanja originalnih podataka od teoretskih, odnosno najbolje prilagođena krivulja trenda bila je krivulja trećeg stupnja predočena jednadžbom $Yc=a+bx+cx2+dx3$.

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