



Removal of Swedish sows

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Abstract

To generate knowledge on sow removal, data was collected from 21 commercial piglet-producing herds in the south-central part of Sweden. The analysis is based on 21 134 Landrace×Yorkshire sows with at least one farrowing in the period 2001-2003. A removal code describing if the sow got a next parity (=0), or if the sow was removed (=1) was assessed each farrowing. All effects included in the statistical model (logistic regression) were highly significant: herd, farrowing year within herd, farrowing date (two-month periods), parity number and the interaction between herd and parity number. The proportion of farrowings followed by sow removal varied between herds. Farrowings in parities 4 and 5 were to a significantly higher proportion followed by sow removal, compared with farrowings in lower parities. Furthermore, farrowings during May-June and July-August were to a significantly higher proportion followed by sow removal, compared with farrowings during the rest of the year.

Introduction

High removal rate, especially of young sows, is today both an economical and an ethical problem. Sows that are removed before their third parity give a negative cash flow (Lucia et al., 2000a; Stalder et al., 2003). The maximum economic lifespan of a sow varies between studies but it's reported to be at least five parities (Scholman and Dijkhuizen, 1989; Lucia et al., 2000a; Rasmussen, 2004). However, a large proportion of the sows are removed earlier. Approximately 15 % to 20 % of the removed sows have had only the first parity (Boyle et al., 1998; Lopez-Serrano et al., 2000; Lucia et al., 2000a). The average parity number at removal in commercial herds varies from 3.1 to 4.6 (Boyle et al., 1998; Rodriguez-Zas et al., 2003; Akos and Bilkei, 2004).

Annual replacement rate has been reported to vary between 43 % to 60 %, but with large variation between herds (Paterson et al., 1996; Boyle et al., 1998; Rodriguez-Zas et al., 2003). The proportion of planned culling, i.e. mainly culling due to old age or low productivity increase with higher parity number (Dijkhuizen et al., 1989; Boyle et al., 1998). Sows removed due to unplanned culling are mainly young sows, and are mostly removed due to reproductive failure or locomotory problems (Dijkhuizen et al., 1989; Boyle et al., 1998; Le Cozler et al., 1999). The most common reported reason for removal of sows is reproductive failure, which represent approximately one third of all removals. Leg weakness and/or locomotory problems are reported to account for 11-14 % of the removals while low production or poor performance contribute to 10-21 % (Boyle et al., 1998; Heinonen et al., 1998; Lucia et al., 2000b).

The aim of this study was to identify factors that influence the removal of Swedish crossbred sows. The project was financed by the Swedish Farmers' Foundation for Agricultural Research

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Material and methods

During the period 2001 to June 2004 data was collected from 21 commercial piglet-producing herds which were using the PC based herd monitoring program "PigWin Sugg" (Quality Genetics HB, Kävlinge). All these herds had at least 100 sows each, and were located in the south-central part of Sweden. The mean and median herd size were 429 and 288 sows respectively, with a range between 107 and 1896 sows. The total sow population in the 21 herds was about 9 000. Some herds in the study have during the study period increased their herd size, but no herd increased or decreased by more than 15 %. Four of the herds were "sow pools" which is a system where a central herd unit supplies other herds, "satellite herds", with pregnant sows in a "leasing system". The pregnant sows are transported to the satellite herds approximately three weeks before expected farrowing. After weaning, the sows are returned to the central unit to be mated for the next reproduction cycle, or sent for slaughter.

All sows included in the study were crossbred Landrace x Yorkshire in different combinations. Artificial insemination was used in all herds in a high proportion (~90%). Four herds culled sows if they return to oestrus after the first mating, 13 herds culled sows after two returns and four herds accepted three or more returns to oestrus before culling. All herds practised batch-wise production, a kind of fixed circulatory system. A batch is a group of sows which are weaned at the same time, bred within a short period of time, kept together during the pregnancy and that farrow, in most cases, within the same week. The number of sows in one batch and the number of weeks between two batches, varies between herds (from one to eight weeks). The average lactation period was between four and five weeks. The sows were after weaning group-housed in a breeding unit where they stayed, depending on herd, during one to seven weeks and were thereafter moved, still group housed, to a gestation unit. In 14 herds the dry sows were kept in groups (30-50 sows per pen) on deep litter bedding (mostly straw) in mostly unisolated buildings in both the breeding and gestation units. Ten of these herds had individual feeding stalls in both units. The remaining seven herds kept their dry sows, during at least a part of the dry period, in groups (5-9 sows per pen) but on concrete/partially slatted floor with access to straw. In the farrowing unit sows were in all herds housed in individual pens.

A removal code describing if the sow got a next parity (=0), or if the sow was removed (=1) was assessed each farrowing. In total, data on 21 134 sows with at least one farrowing during the period 2001-2003 was included in the analyses, but information on farrowings from the first half of 2004 was also included to see whether the sows' got a next litter. The statistical analyses were restricted to data on the first five parities, i.e. 51 412 farrowings. This gives that 10 819 farrowings with parity six and higher were excluded. The information was analysed using the SAS PROC MIXED and the GLIMMIX macro. The final model included herd, farrowing year within herd, farrowing date (two-month periods) parity number and the interaction between herd and parity number. The least-squares means generated were transformed into percentage values, giving the proportion of sows removed after farrowing.

Results

All effects included in the statistical model: herd, farrowing year within herd, farrowing date (two-month periods), parity number and the interaction between herd and parity number were highly significant ($p < 0.001$).

The proportion of farrowings followed by sow removal varied between herds (range: 10.4 %-28.6 %), see Figure 1 below. The mean and median proportion removed were 17.8 % and 17.9 % respectively.

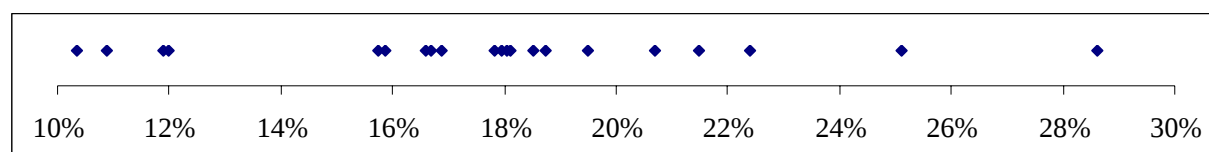


Figure 1. Average proportion sows removed after farrowing for the 21 herds.

Farrowings in parities 4 and 5 were on average more often followed by sow removal (18.1 % and 22.8 %), compared with farrowings in lower parities (15.2-15.9 %) ($p < 0.01$), see Table 1.

Table 1. Proportion of sows removed after parities 1 to 5

Parity	Number of farrowings	Proportion removed
1	14913	15.9 %
2	12178	15.2 %
3	9974	15.7 %
4	8070	18.1 %
5	6277	22.8 %

Furthermore, farrowings during May-June and July-August were to a significantly higher proportion followed by sow removal (18.7 % and 18.6 %), compared with farrowings during the rest of the year (16.5-17.1 %) ($p < 0.01$), see Table 2.

Table 2. Proportion of sows removed after farrowing in two months periods

Two- month period	Number of farrowings	Proportion removed
Jan.- Feb.	8166	16.9 %
Mar.- Apr.	8773	17.1 %
May- Jun.	8663	18.7 %
Jul.- Aug.	8953	18.6 %
Sep.- Oct.	8596	16.7 %
Nov.- Dec.	8261	16.5 %

Discussion

The statistical analysis performed in this paper was a multi-factorial analysis. The variable (removal code) that was generated is closely related to the one used in stayability analyses (Lopez-Serrano et al., 2000) and it calculated the risk to be removed. All factors in the statistical analysis were highly significant (herd, farrowing year within herd, farrowing date and parity number, including the interaction between herd and parity). This interaction may be due to the difference between herds in removal reasons and removal parity number, giving a specific removal pattern for each herd. A more thorough report on this will be published later.

The large, difference in proportion of sows removed between herds depends on several factors on herd level, including management, housing system, health status and culling policies. The average, 17.8 % corresponds to an annual removal rate of approximately 40 %. This figure was a somewhat lower than what have been reported in other studies (Paterson et al., 1996;

Boyle et al., 1998; Rodriguez-Zas et al., 2003) but that might be due to the reduced material in the present study, only including the first five parities.

The most common way to present removal proportion for a specific parity is to divide the number of sows removed after that parity with the total number of removed sows during the same period. Such figures from the present project has previously been published (Engblom et al., 2004) and those figures were in agreement with those from other studies (Boyle et al., 1998; Lopez-Serrano et al., 2000; Lucia et al., 2000a). In the present study the proportion removed has the number of sows farrowing in that specific parity in the denominator. This results in that the proportion removed per parity was much higher for parity four and five compared with lower parities. This is caused by the lower number of sows farrowing in higher parities.

The analyses used in present study give the possibility to test each farrowing for the effect of season. The result showed that a significantly higher proportion of sows that farrowed during May-June and July-August were removed compared with sows farrowing during the rest of the year. One reason for the higher removal proportion during the summer was the higher number of sows found dead during this season, as shown in another part of this project (Engblom et al., 2004). Another reason could be that sows which farrowed during the summer weaned their litters and were mated during autumn when normally, a higher proportion of sows return to oestrus after breeding (Tummaruk et al., 2000).

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