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Reasons for Planned and unplanned culling in Breeding Sows: The case for the PIB Farm in Zimbabwe

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Abstract

A study was conducted to identify reasons for sow wastage and parities most susceptible to particular reasons. The study was based on raw data collected from sow record books. A total of 1961 sows were culled during the period under study. Low productivity was the major reason for culling, accounting for 36.82% of all culls. This was followed by leg problems (26.31%), reproductive (16.37%), miscellaneous (11.01%), death (6.94%), and lactation problems (2.55%). The two variables, parity and reason, were negatively and significantly ($p<0.05$) correlated ($r= -0.47$). Reason-specific removal rate was not the same for all parities. Culling was severe for parities above 7 and below 3, but moderate for parities 3 to 7. The predominant reason for culling for parities above 7 was low productivity. For parities below 3, the reasons leg and reproductive problems were predominant. Mortality of 6.94% was on the high side and required urgent attention.

Introduction

Most pig enterprises are run on the widely promoted objective of managing sows for longevity in the herd. This is because of the positive relationship between longevity and herd productivity. Sows are most productive when they are in the parity region 3 to 7 (English et al., 1977; Te Brake, 1986 and Welch, 1996).

Below parity 3, sows are generally less productive. Their mothering ability is not yet fully developed, as seen by high piglet savaging, high pre-weaning mortality and high intra-partum deaths. They also exhibit a delay in return to heat after weaning, which increase the number of non productive sow days. Since most pigs in their early parities are still growing and physiologically immature, their feed conversion ratio is high, as a result they give low piglet weights at birth and at weaning. They partition nutrients between their growth requirements and those of the foetus. Their uterine capacity also tends to limit the birth weights of their piglets (Dzama et al., 1995).

Sows occupying parities around 7 and beyond begin to show signs of old age and degeneration. They exhibit increased stillbirths, irregular birth weights, low numbers of piglets born alive, and high pre-weaning mortality. The increase in farrowing problems, such as Dystocia, in old sows has been attributed to reduced muscle tone which sets in with age, and the more variable litter weights (English et al., 1977).

To realize and maintain high herd productivity farmers should adopt a culling and replacement policy that retains an optimum herd age structure. When following such a policy a culling rate of about 30% to 35% should be realized, inclusive of 3% to 5% allowance for sow mortality (Welch, 1996). However, the realized culling rate is determined by the relative proportion of planned to unplanned culls in a culling policy. Planned culls are for poor performance and old age, and these are preset culling standards. Unplanned culls are for clinical problems such as leg problems, fertility, disease, etc.

The effect of planned culling should be of increasing herd productivity, by decreasing the frequency of undesirable genes, since it is based on production criteria. On the other hand unplanned culling does not necessarily improve herd performance, or its genetic merit, for even genetically superior animals might have their linear function compromised leading to their culling. The greater the proportion of planned culls the more desirable will be the effect on herd age structure as more of the sows will be within the 3 to 7 parity region.

One of the major problems faced by pig farmers is sow wastage through very high culling rates. Rates of between 39% and 50% per annum have been reported (Dagorn et al., 1979). Such high culling rates reduce sow longevity in the herd and in turn, herd productivity. The high culling rates observed usually indicate that unplanned culls occupy a much larger proportion of the total culls, i.e., over 70% (Stein et al., 1990; Welch, 1996).

Although sows are removed along their whole reproductive life, reason-specific rate of removal is not the same for all parities (Friendship et al., 1986; Doumard et al., 1993). It is their for possible that, by investigating how a particular culling reason is expressed across parities it should be feasible to identify the parities most affected and the possible root cause.

The objectives of this study were to:

1. Identify reasons for planned and unplanned culling in breeding sows
2. Determine the contribution made by each reason to total culling.
3. Determine parity-specific contribution made by each reason to total culling.

Materials and Methods

Project site

The study made use of raw data collected from sow record books at Pig Industry Board (PIB) Experimental farm. The farm has the mandate for central performance testing of pigs in Zimbabwe. The farm is in Arcturus, about 30Km east of Harare, in an intensive mixed crop area. The altitude is approximately 1500m above sea level. Mean temperature during the warm humid summer (October to March) average 21 °C while the cool dry winter averages 16 °C. The area receives a mean annual rainfall of about 800mm.

Management of the Commercial herd

Replacement policy and turnover rate

The data used was from sows which were part of the commercial herd. The management was such that piglets were weaned at 5 weeks and were creep fed for 3 weeks. The herd turnover rate at the farm was once in three years, when sows reached parity 7. Replacement gilts were selected from the piglet crop within the herd. At 8 weeks candidate piglets were taken to the testing station, located at the farm. Pre-selection was done before sending the piglets for testing. Pigs were taken in for testing only if they were from gilt litters of not less than 9 born and 7 weaned and sow litters of not less than 10 born and 8 weaned, and also if it was not a diseased litter.

Nutrition and Health

Replacement gilts were fed 4Kg per animal per day of sow meal up to mating. Older sows were fed 5Kg of sow meal per animal per day from weaning to mating. All breeding females received 2Kg of sow meal per animal per day from mating to farrowing. Gilts were vaccinated against Sterility, Mummification of piglets, Embryo Death and Infertility (SMEDI) two to three weeks before mating. Sows were vaccinated only when there was an outbreak reported.

Breeding and Housing

All breeding females were observed for heat using the riding test. Those showing signs of heat by standing when pressed on the back were brought to the boar for service. Sows were then mated three times using the same boar at 12, 24 and 36 hours respectively, after the first signs of standing heat. Pregnancy diagnosis was carried out 28 days after mating and sows that were not pregnant were again mated at 12, 24 and 36 hours following heat detection. Sow failing to conceive following the second heat were culled. Boars used were either bought-in or bred on the farm. The Large white, Landrace and their crosses were used as dam lines. Sire lines were of Duroc, Large white, and Landrace breeds. In-pig sows were kept in cubicles and stalls which allowed for individual feeding, especially when the need to correct body condition arose. The cubicles had slatted metal floors for easy cleaning. The gestation diet was 13.6% CP and the lactation diet was 16% CP.

Data collection and statistical analysis

The necessary information was collected from sow record books at the station. The data was on the individual sow's parity at culling and the reason for culling. A cull was specified as a sow removed from the breeding herd after satisfying at list one of the criteria for culling. Gilt was defined as a female pig over six months of age selected for breeding and mated to a boar, until she farrowed her first litter. Thus she was said to be in parity 0. Sows were specified as female pigs that had farrowed one or more litters. All sows in parity 8 and above were pooled. The final data set comprised of n = 1961 sow records. For purposes of statistical analysis, reasons for culling were grouped into six major categories and coded as shown in table 1.0. A full explanation was given for each category so created. The unit of analysis was the sow with two observations made, parity at culling and reason for culling. The data was subjected to proc frequency (SAS, 1988), and proc correlation (SAS, 1988).

Results

Table 2.0 present the correlation analysis for the two variables, parity and reason. These two variables were shown to be negatively and significantly ($p<0.05$) correlated. This means that, moving from low to higher parities, the variety of reasons for sow culling within a parity decline. This is confirmed in Figure 1.0., which shows the different reasons, their percentage contribution across parities and their within parity contributions to total culling and parity culls, respectively. In the later parities, the major reasons for sow culling were mainly the planned reasons (old age and low productivity). All other reasons, mainly the unplanned reasons for sow culling, were most frequent in the early parities. This then means that reason-specific removal rate was dependent upon the parity under investigation. Figure 2.0 show the change in parity-specific removal rate with parity. This showed the effect the current culling policy had on the herd age structure.

Table 1: Reasons for sow culling

Code Number	Reason for Culling
1	Low productivity (small litter size at birth, i.e., less than 5, and old age).
2	Mortality (death, due to toxaemia, kidney failure and urinary infections, stress, prolapse, caught between rails, internal haemorrhage, pneumonia, twisted gut, and unspecified reasons).
3	Leg problems (lameness, swollen, splay, poor or unsound legs).
4	Lactation problems (savaging of piglets, mastitis, metritis, agalactia, low milk production, insufficient numbers at weaning, i.e., less than 8 weaned piglets).
5	Reproductive problems (none return to heat after weaning, prolonged weaning to heat interval and not in-pig).
6	Miscellaneous (farrowing problems, abortion, prolapsed, cystitis, abscess, bleeding, injured, and reason not given.

Table 2: Correlation analysis between parity and reason (rho, p-value)

	Parity	Reason
Parity	1.0	-0.47
	0.0	0.0001

Figure 1: Effect of parity number on reasons of culling.

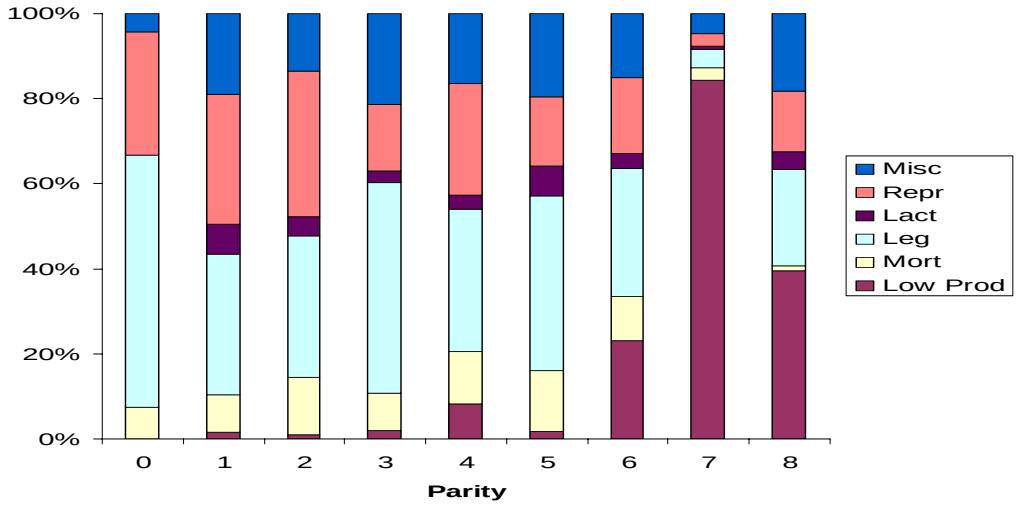
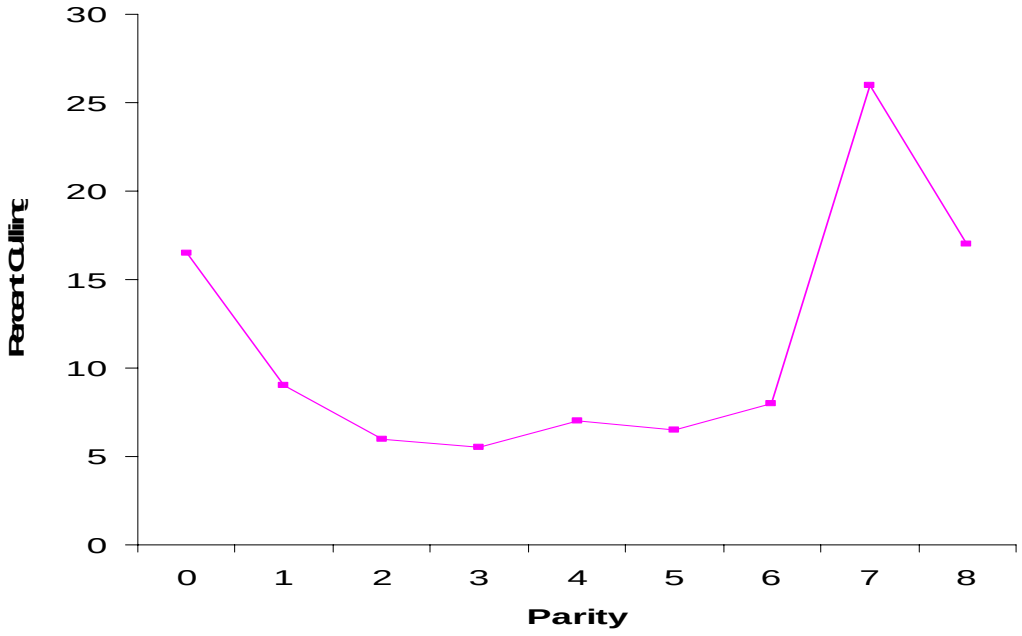


Figure 2: Culling rate by parity



Discussion

Reasons for sow culling

Old age and low productivity constituted the planned culls, and the rest where unplanned culls. Low productivity was the major reason for sow removal, accounting for 36.82% of all removals. The results are in agreement with the work of Bent (1987), Stone (1981) and Pattison (1980), who reported 39%, 38% and 38% respectively. The value of 36.82% falls within the ideal range of 30 to 40% (Boyle, 1996). This suggests an acceptable number of sows were being culled on performance criteria, which has the desirable effect of reducing frequency of undesirable genes, thereby improving on herd performance.

Culling for leg problems was the most significant reason for involuntary culling. It represented the major cost on replacement. The 26.31% reported from this study is significantly higher than values reported elsewhere. Stone (1981) reported 11.3%, and Bent (1987) reported 12%. In the study by Bent (1987) reproductive problems constituted the major reason for involuntary culling and leg problems ranked second.

Death accounted for 6.94% of all removals. Other studies reported values ranging from 3 to 12% (English et al., 1977; Dagorn et al., 1979; Stone, 1981; Friendship et al., 1986; Bent, 1987; Stein et al., 1990). Reproductive problems accounted for 16.37% of all removals, the third major reason for sow culling after low productivity and leg problems. In most of the previous investigations reproductive problems made up the highest proportion of removals, for low productivity herds, and second highest for high productivity herds. The values varied from 16.85% to 32% for high productivity herds (Pattison, 1980; Stone, 1981; Bent, 1987), and 29.6% to 43.3% for low productivity herds (English et al., 1977; Dagorn et al., 1979; Friendship et al., 1986; Stein et al., 1990).Lactation problems accounted for 2.55% of all removals. Other workers reported values ranging from 6.6% to 16.4% (English et al., 1977; Bent, 1986; Stein et al., 1990). The miscellaneous group accounted for 11.01% of all removals.

The proportion of planned to unplanned culls in this study was 36.82: 63.18. The least acceptable ratio is 30:70 (Stein et al., 1990; Welch, 1996). The effect of this proportion on the herd age structure was obtained by plotting culling rate by parity, Figure 2.0.

Reason-specific removal rate across parities

Culling for reproductive problems was more severe in the early parities (0 to 2). Approximately 58% of sows culled due to this problem were removed before reaching parity 3. Half of this 58% was for gilts, in parity 0. After parity 3, contribution by reproductive problems decreased linearly with parity. Dourmad et al., (199) reported that the likelihood of culling sows for reproductive problems decreased as parity number increased. He also found out that reproductive problems contributed more than 50% of total culls after weaning the first litter.

Leg problems were most severe in parity 0. 36.63% of sows culled due to leg problems were gilts in parity 0.The culls due to leg problems declined with increase in parity number. Other workers also found that leg problems were serious in the early parities and declined in importance in the later parities (Dourmand et al., 1993; Stein et al., 1990).

Old age and low productivity increased in severity with parity, such that it became most sever in parities 6 to 8, which contributed 97% of sows culled due to low productivity.

Conclusions and Recommendations

Conclusion

The percentage of planned culls of 36.82% falls within the ideal range of 30 to 40% of total culls. This indicates that the purposeful culling of animals on this farm was within the targeted range. However the incidence of leg problems reported was too high and needed further investigations.

General Recommendations

The prevalence of leg problems on a farm is directly related to levels of hygiene as well as floor type. It is generally recommended that the farmer avoid housing in-pig gilts and first parity sows on slatted floors, as these aggravate any congenital leg problems. Generous provision with bedding is also recommended to reduce tear and wear of the feet of pigs which expose them to mycoplasma challenge. Sow body condition should always be corrected before serving the gilt, for once it starts its reproductive occupation it will be difficult to correct it.

References:

Bent, G. (1987), *The Pigman`s Handbook.* Farming press limited, Suffolk, UK. Pp 108 – 113.

Boyle, L. A. and Lynch, P.B. (2003). S*tudies on the behaviour and welfare of sows housed in groups with free access stalls.* End of Project Report No. 4676, Teagasc, Moorepark. 48pp.

Dargon, J. and Aumaitre, A. (1979), "*Sow culling: Reasons for and effect on productivity*.'' In Livestock Production Science, Vol. 6: 167 – 177. Elsevier Scientific Publications, Amsterdam.

Dourmad, J.Y., Etienne, M., Prunier, A., and Noblet, J., 1993.*''The effect of energy and protein intake of sows on their longevity.*'' FEZ-EAAP-EVT-44th Meeting – Session 3, Effect of feeding on the longevity of sows – Aarhus – Denmark, 16 – 19 August 1993. pp 1 – 10.

Dzama, K., Mandisodza, K., Mungate, F., and Shoniwa, A. (1995) ''A *study of the productivity of pigs at the Pig Industry Board farm in Arcturus.''* In Dzama, K., Ngwerume, F.N., and Bhebhe, E. (1995) Proceedings of the international symposium on livestock production through animal breeding and genetics; University of Zimbabwe, Department of Animal Science, May 10 – 11, 1995. pp 77 – 82.

English, P.R., Smith, W. and Maclean, A. (1977). *The sow – improving her efficiency*. Farming Press Ltd. pp 76 – 89.

Friendship, R.M., Wilson, M.R., Almond, G.W., McMillan, I., Hacker, P.R., Pieper, R., and Swaminathan, S.S. (1986) ‘’*Sow Wastage: Reasons for and effect on productivity*.’’ In Canadian Journal of Vet. Res. Vol. 50: 205 – 208.

Pattison, H.D., Cook, G.L., and Mackenzie, S. (1980) ‘’*A study of culling patterns in commercial pig breeding herds.’’* In Animal Production Vol. 30: 462 – 463.

SAS. (1988) *SAS/STAT User`s Guide* (Release 6.03). SAS Inst. Inc., Cary, NC.

Stein, T.E., Dijkhuizen, A., D`Allaire, S., and Morris, R.S. (1990) ‘’*Sow culling and mortality in commercial swine breeding herds.*’’ In Preventive Veterinary Medicine Vol. 9: 85 – 94. Elsevier Science Publications B.V., Amsterdam.

Stone, M.W. (1981) ‘’*Sow culling survey inAlberta*.’’ In Canadian Vet. Journal Vol. 22 : 363.

Te Brake, J.H.A. (1986) ‘’*Culling of the sows and the profitability of piglet production*.’’ In Netherlands Journal of Agric. Science Vol. 34 : 427 – 435.

Welch, B. (1996) *Adopting a sow replacement policy*. The Colcom Foods Ltd. Extension Department Newsletter – Pig Tales (unpubl).