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Levels of culling in commercial herds

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Introduction

The culling rate is a statistic that is often used and misused. It should be emphasized that it is not a direct function of replacement rate. Instead, replacement rate is a net result of mortality, transferals, changes in herd inventories, and culling. Likewise, culling is far from simply being based on sow characteristics. It is based on a complex interplay between the characteristics of the sow, expected subsequent performance, and expected performance of replacement stock¹.

Method

In this study, approximately 140,000 parity records across 15 large commercial sow farms in the American Midwest were studied for the years 1996–1998. In addition, summaries were created by week to study performance across breeding groups. Analysis was made using SAS². A multivariate logistic regression was created to study individual sow characteristics and a multivariate linear regression was made to study breeding group characteristics.

Results

Figure 1 shows the average cull rates for each of the three years plus 1995, where limited data were available. Cull rates have stayed relatively consistent while mortality rates have generally increased. **Figure 2** shows the seasonal culling rates, which seem to be countercyclical to what has been depicted in sow mortality. Culling rates for parity are shown in **Figure 3**; they identify an increase in rates with increased parity, especially after parity 4. **Figure 4** is a cumulative distribution graph depicting the cumulative proportion of sows culled after farrowing.

The logistic regression of sow culling rate per parity record was controlled for parity and seasonal effects. The rate of culling increased by 8%, with 1 or more stillbirths in the preceding litter ($P < .001$), decreased 2% with each extra piglet in the litter ($P < .001$), and decreased 0.04% with each extra day of age at entry.

At the breeding group level, when the breeding group culling rate was predicted, the largest predictor of culling rate was the size of the gilt pool. As the gilt pool increased by 1% as a proportion of the sow herd ($P = .002$), culling

Figure 1: Rates of Culling

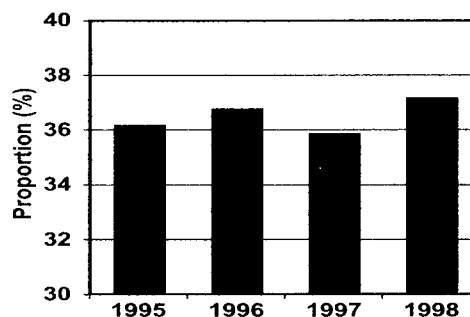


Figure 2: Seasonal culling patterns

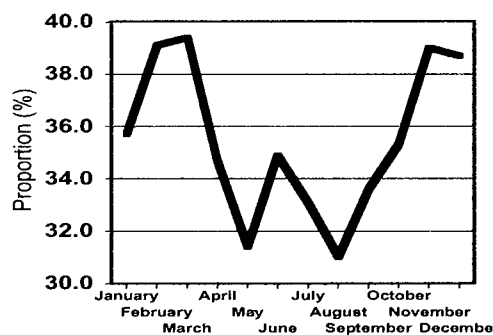


Figure 3: Parity effects

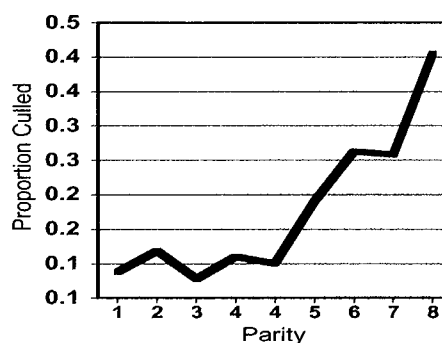
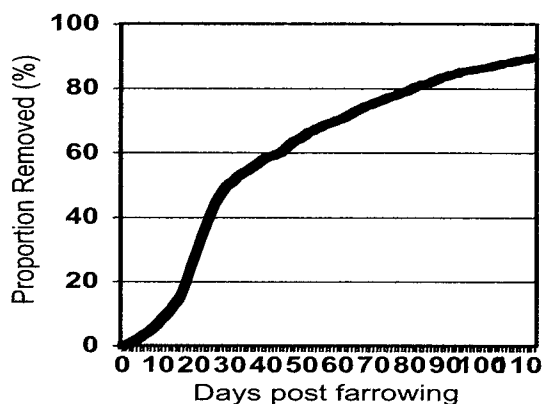


Figure 4: Cumulative frequency of culling post farrowing



rate increased by 4%. Likewise as the parity of farrowed sows increased, the culling rate increased 4.4% per 1 parity increase.

Discussion

Breeding stock replacement is a dynamic practice influenced by many circumstances. Size of herd, breed, desired genetic improvement, changes in inventory, lactation length, and other factors play a role in individual farm removal rates³. Likewise, there is herd to herd variation in criteria and production policies used to make culling decisions. Finally, it is generally accepted that market trends are a significant factor in sow removal rates.

Animals are culled when they either are unsuitable for production or can be replaced by a more productive animal. Annual sow culling rates are varied, with reported averages of 40–50%^{4,5,6,7}. Interestingly, annual sow culling rates have not increased dramatically over time—unlike sow mortality rates—and in the United States large herds (>1200sows) tend to have a lower culling rate compared with small herds (100–200sows)⁸. This study reflected a consistent culling rate over time (36–38%), and emphasized the summer high mortality rate/low culling rate relationship followed by late autumn peaks in culling practices.

Primary reasons for sow culling continue to be:

- reproductive failure,
- locomotor problems,
- degenerative problems/old age, and
- performance^{9,5,7,3}.

Interestingly, lower early lactation feed intake has been associated with increased risk of culling owing to subsequent reproductive failure (anestrus, failure to conceive, etc.)^{10,11}. Gilts represent the largest proportion of repro-

ductive (failure to conceive and anestrus) and locomotor culls, with the risk of removal decreasing as parity increases^{7,12}. Sows are generally culled owing to performance (small litter size, lactation performance, etc.), and age^{12,4}. In this study it is not surprising that gilt pool—as with sow mortality¹³—was an important and influential aspect of culling. Likewise, as a result of increasing age, culling rate increased as older parities farrow.

High removal rates are costly. Although earlier work determined that culling was not necessarily related to the productivity of a herd (measured in P/S/Y)⁹, more recent studies suggest that higher parity at removal is associated with improved sow lifetime productivity^{14,15}. In addition, it has been demonstrated that systems with lower replacement rates were more profitable than systems with higher replacement rates¹⁶. The present study identified that, as productivity increased (fewer stillbirths and extra piglets/litter), culling rate decreased.

Management plays an important role in maximizing sow productivity. Maintaining health through proper acclimatization, ensuring comfort by reducing accidents and injuries, providing access to adequate food and water, closely monitoring reproductive cycles, breeding appropriately, and tending to sow needs throughout lactation are essential components of sow longevity. Similarly, replacing breeding stock demands thorough planning, preparation, and a continuous supply of replacement gilts. Ultimately, these elements in unison are the key to sow farm profitability.

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