Eventually, all sows that enter a herd will be removed. Some will leave on account of poor health or welfare. These removals can be considered as biologic, or involuntary, culls. The others are removed because of poor historical productivity, the risk of poor future productivity, or old age. These removals can be considered as economic, or voluntary, culls (Fetrow et al., 2004). The value in reducing rates of involuntary culls is relatively easy to understand. The value of reducing voluntary culls merits further consideration.

VALUATION

All models are subject to their assumptions, and economic models are no different. The decision about when to cull a sow is a function of both how the sow and her replacement are valued. Is the sow worth the piglets she farrows/weans during a unit of time? Should we take into account her ability to achieve subsequent parities (i.e. a parity 4 sow is more likely to achieve five parities than is a parity 1)? Should differential values be assigned to first litter offspring (Mahan, 1993; de Grau et al., 2005; Larriestra et al., 2005b; Larriestra et al., 2006; Smith et al., 2007)?

Several models have been presented that consider optimal parity of removal (Kroes and Van Male, 1979; Dijkhuizen et al., 1986; Faust et al., 1993a, 1993b; Dhuyvetter, 2000; Rodrigues-Zas et al., 2006; Dhuyvetter et al., 2007). Recommendations are often determined according to the average performance of parity-specific populations. While general conclusions can be interesting and useful for big-picture planning, they pertain to the average sow and have limited practical guidance for the individual sow culling decision (Dhuyvetter et al., 2007).

Further, if a decision to retain or replace a sow is function of the future productivity of that sow relative to the average replacement gilt, then we also need to be able to predict that sow’s future performance. Investigations into the repeatability of measures such as born alive suggest that a sow effect explains less than 20% of the variability in litter size (Dewey et al., 1995; Roehe and Kennedy, 1995). This should not be surprising, however, since many factors, including
season, semen quality, insemination technique, and sow plane of nutrition during follicular development, have all been demonstrated to affect conception rates and/or litter size (Southwood and Kennedy, 1991; Koketsu and Dial, 1997; Rozeboom et al, 1997; Xue et al, 1998a; Xue et al, 1998b; Foxcroft et al, 2007).

**IMPLICATIONS**

There are two major considerations that should follow from the limits of our modeling capabilities. First, what are the implications of the counterfactual? (i.e. What would be the economic and production impact to the herd if we employed a less aggressive voluntary culling protocol?) Would the uncertainty of the average gilt’s future productivity overcome that of a predictably lower but more reliable sow’s? Does the contemporary herd productivity affect the ability of herd management to make effective removal and replacement decisions? (i.e. If a sow herd is struggling with conception, would the same factors affecting sow conception affect gilt conception as well?)

The second major consideration is the potential to optimize the value of the sow space over time. This is a concept borrowed from the dairy industry (de Vries, 2006a,b; Eicker, 2007; Eicker et al, 2007), and the determination to retain or replace a sow is a function of which animal’s future productivity yields a higher net present value. While the limitations of our ability to predict the future performance of an individual sow renders this exercise more theoretical than practical, a model of the universal gilt (the average replacement female with respect to productivity and survival) can be informative with respect to herd parity distribution and production dynamics.

**REFERENCES:**


