factsheet

Pork Information Gateway

Non-Productive Days: Their Significance and Control

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Definition

Productive sow days are those days when a sow or gilt is either pregnant or lactating. Therefore, a non-productive day (NPD) is any day that a sow, or a gilt once entered into the breeding herd, is neither pregnant nor nursing a litter. The number of NPD is calculated as 365 days – ([gestation days + lactation days] x litters/sow/yr). The primary significance of NPD is that they reduce the number of possible productive days and, therefore, they limit the potential number of litters per year. Assuming maximum sow inventory, limiting the number of litters produced will adversely affect the efficiency of facility utilization. The economic impact of fewer litters will depend on the value of the finished product. The number of NPD influences the ideal sow inventory since with high NPD, more sows will be needed to maintain consistent weaned pig output. If there are excessive NPD (e.g. 85 days), then there are only 280 remaining productive sow days left in the year. Further, if gestation days and lactation days are combined (e.g., 114 + 21 days = 135 days), then the maximum number of litters possible per sow is 2.07 (280 days/135 days). If there are fewer NPD (e.g. 35 days), then there will be 330 productive sow days in the year, and the potential number of litters is 2.44 (330 days/135 days). In each of these scenarios, if the number of pigs weaned equaled 10 pigs, then the effect of the 50 extra NPD between the two scenarios (85 days – 35 days) would result in 3.7 fewer pigs produced each year for each sow (24.4 – 20.7 pigs/sow/year). Put another way, each NPD is worth 0.074 pigs (3.7 pigs/50 days), or more if weaned litter sizes are larger than 10 pigs. However, the true significance of this will depend on whether pork production is profitable or not.

Effects of NPD on Sow Inventory

The purpose of the sow herd is to produce pigs that will eventually be marketed as pork. The number of NPD may impact sow inventory because fewer sows will be needed to meet finishing barn targets with a more productive herd (and vice versa) and, also, NPD imply that a proportion of the sow herd is inactive (i.e. non-productive). Further, the numbers of NPD may vary during the year, possibly increasing more during the summer and fall with implication for future finisher pigs marketed. One method to estimate the appropriate number of sows required is to calculate the potential pig production. For example, if a farm is farrowing 72 sows per week and has a target of 2.44 litters per year then this farm has the potential to produce 3744 litters/year (72 sows x 52 weeks). If the total litter target (3744 litters/year) is divided by the target litters/sow/year (2.44) then the result is the number of sows needed (= 1,534 sows). However, this does not yet account for non-bred gilts or non-productive sows (e.g., those that are bred but not pregnant, or those that are anestrual). To account for these gilts and non-productive sows, you must account for NPD. To more accurately calculate the appropriate sow inventory for a herd, first determine the number of sow groups. The number of active groups is determined from gestation length (114 days) + lactation length (21 days) + wean to service interval (6 days) / the farrowing interval between groups (in days; i.e., 141 days / 7 days = 20 active sow groups). The proportion of inactive sows is calculated as NPD/365 days. For example, 35 non-productive sow days / 365 days results in 9.6% of the sows classified as inactive. To compensate for the inactive sows (9.6%) in order to meet production targets, the actual number of sow groups (100%) should be adjusted to 109.6% (20 x 109.6%/100% = 22 sow groups). This could then be used to calculate total number of sows needed in the herd to reach targets. For example, if we have a farm that targets farrowing 72 sows per week, then inventory required to meet farrowing capacity is calculated as the total number of sow groups (22) x the number of farrowing crates available per week (72) x breeding herd capacity (e.g., 105%/100%) = 1,663 sows.

Assuming gilts are recorded on entry to the breeding barn, this total includes replacement gilts.

Cost of NPDs

Farm costs vary constantly, but if we assume 5 lbs. of feed at $0.10/lb., it costs $0.50 per day to feed a pregnant sow. Assume that one NPD costs 1.3 x the feed costs ($0.65), and that a weaned pig is worth $35. Therefore, one NPD costs $0.65 + (0.074 pigs (see definition paragraph) x $35), = $3.24, and the lost potential for profit from pig production is in the opportunity cost of the NPD. Clearly, assuming finishing capacity is not limiting, the biggest component of the cost of an NPD is the opportunity cost of the pork not being sold. If the profit margin over production cost is positive, then an NPD can be expensive but, if the margin is negative, the cost of an NPD is also negative. The profit margin over costs of production may vary with time of year, usually being larger during the summer. In this case, the ability to market more pigs at this time will influence the value of each NPD. While knowing the number of NPDs allows assessment of problems, it does not indicate the nature of the problem. Therefore, before trying to reduce NPDs, it is necessary to first determine where in the sow life cycle the excessive NPDs are accumulating. The composition of the total NPDs includes components specific to gilts, those specific to sows, and those common to gilts and sows.

Gilt Specific NPD

Gilt NPDs are days are counted from their entry into the breeding herd until the time of their first service or to their removal for anestrus or other non-reproductive reasons. Depending on gilt management in quarantine (e.g. whether are they boar exposed) and level of development (weight) at time of entry into the breeding barn, a typical target for the entry-to-service interval is ~35 days or less. If the gilts are sufficiently developed and appropriately stimulated with boar exposure, then most gilts should be pubertal within 28 days and will have their second estrus 21 days later. Any gilt remaining anestrus after 28 days could receive hormone treatment (e.g., PG600) but culled if not bred by 7 days after injection or are bred but fail to conceive. Alternatively, these gilts may be culled at 30 days since, even if finally bred, she will be relatively infertile. If an analysis of herd records indicated that gilt NPDs are a problem (e.g., exceeding 50 days), then things to critically examine are whether the rules of boar exposure are being followed, whether estrus detection is effective and whether gilts truly anestrus or are simply being missed. Also, environmental factors must be assessed as air quality (high ammonia may retard gilt response to the boar), stocking density (high density may delay puberty and will make estrus detection more difficult) and temperature (a seasonal effect) can be the problem. If well developed, appropriately aged and managed gilts remain anestrus, then treatment with PG600 could be considered..

Sow Specific NPD

Sow-specific NPDs are the intervals from weaning to estrus or first service and from weaning to removal for anestrus or other non-reproductive reasons. The wean-to-estrus interval is of particular importance in that sows served at their first post-weaning estrus between 6 and 12 days after weaning are likely to be less fertile, tending to have lower farrowing rates and smaller litters. Longer wean-to-estrus intervals, such as those which may occur with primiparous sows or as a component of seasonal infertility, can be managed with good boar contact after weaning. Boar contact will have no effect on sows with normal wean-to-estrus intervals (i.e., 4 to 5 day) but the incidence of longer intervals can be reduced. Also, appropriate hormone treatment can be employed to induce a shorter wean-to-estrus interval (PG600) or to suppress estrus (Matrix) to increase post weaning recovery time. Alternatively, and primarily with primiparous sows, skip-a-heat breeding is effective but, in common with estrus suppression, it will increase NPDs, so a cost-benefit analysis should be performed. If analysis of NPDs indicates many sows are having wean-to-estrus intervals of 18 days or more, consider the possibility of estrus occurring in late lactation or very soon after weaning. This may result from long lactations and small litters, and especially if split-weaning is practiced. Also, examine for the possibility of poor estrus detection and critically examine the ratio of 21-d to 42-d returns (this ratio should ideally be 5:1 with a problem indicated if <3:1).

Prolonged intervals from weaning to removal for anestrus or non-reproductive issues in sows is likely due to poorly defined culling protocols or a failure to follow them. Management should clearly define the conditions under which sows should be culled and encourage their prompt removal. If farrowing rates are too low, consider breeding potential cull sows and, regardless of accumulating NPDs, keep these sows until the target pregnancy rate is confirmed. If there are insufficient pregnant sows, and the cull sows are pregnant, then do not cull them until the next cycle.

Gilt and Sow NPDs

NPDs common to gilts and sows are prolonged intervals from initial service to conception and from initial service to removal. The service-to-conception interval is the sum of the interval of days from a female detected open (due to return to service, pregnancy check negative, abortion, not-in-pig, or failure-to-farrow) and the interval from detected open to re-service and conception. The etiology of these components is a low farrowing rate and poor or delayed detection of non-pregnancy. Causes of low farrowing rate include, but are not limited to, herd parity structure, prior lactation management, various aspects of breeding management, and gestation management. Poor or delayed detection of non-pregnancy is likely a staff training or equipment issue. In common with prolonged intervals from weaning to removal, prolonged intervals from initial service to removal likely involve poorly defined or executed culling policies.

From the forgoing discussion, it should be evident that NPDs will limit herd performance and potential profitability but that appropriate reproductive management will optimize herd fertility and so minimize NPD.