Ardol BV
P.O. Box 21
6114 ZG SUSTEREN
The Netherlands
Tel +31 46 486 1505
Fax +31 46 439 8392
E-mail: info@ardol.nl

Susteren, August 2008

Dear Madam, Dear Sir,

Enclosed you will find an article written by Schothorst Feed Research (Netherlands) about the yearly reoccurring problems with fertility of sows in later summer and early autumn.
In this summary the seasonal dip in fertility and various links are clearly explained.

Everybody is every year confronted with this syndrome that costs a lot of money to the farmers and leads to complaints about feed quality and so indirectly also costs money to the feed industry.

Until now there was no solution that can remedy for this drop in fertility, since nor extra addition of vitamins or amino acids in the feed has any effect.

At ARDOL we have a lot of experience with the use of **Lianol Solapro** in fertility in sows. Therefore we feel confident to present **Lianol Solapro** to you as an effective prevention of this seasonal dip in fertility.
More specific product information of **Lianol Solapro** is available on our website.

The inclusion of one kilogram **Lianol Solapro** in your lactation feed for sows will reduce this late summer dip considerably and your customers will notice the improvement in their sows.

For more information, please do not hesitate to call
Dr. Rudie Forier at +32 495 201 478.

Kind regards,

H.J.M.F. Gillessen
CEO

Schothorst Feed Research

July, 2008

SEASONAL INFERTILITY IN SOWS

Introduction

It is a problem which returns each year: seasonal infertility. This seasonal infertility is characterised in sows by a less apparent expression of being in-heat, an increased percentage of sows returning to estrus at irregular intervals and smaller litters during the winter (autumn losses).
There are various factors which play a role in seasonal infertility including temperature, length of the day (light) and diet. In addition, seasonal infertility is related to a number of factors regarding the sow, including condition and the number of litters the sow has produced.
Seasonal infertility is a consequence of the fact that pig fertility is, by nature, seasonal. In the wild there are no piglets born in the winter, which means that the sows do not go into heat in the summer. This pattern is seldom present in the modern sow, but the sows do exhibit parts of this pattern which are manifested in seasonal infertility. A number of factors which have an influence on seasonal infertility as well as recommendations which can help reduce seasonal infertility are covered in this circular.

General

As mentioned above, seasonal infertility influences the fertility of the sow. Characteristics of seasonal infertility are an increase in the weaning to estrus interval, later ovulation, less clear expression of in-heat behaviour, a lower pregnancy percentage, decreased percentage of piglets born and smaller litters. It is clear that factors related to fertility are negatively influenced by seasonal infertility, but it is still unclear which factor influences which specific mechanism.
An extended interval between weaning and estrus and later ovulation are consequences of insufficient or late release of the hormone LH (luteinizing hormone) at the time of weaning. The release of this specific hormone is necessary to initiate egg cell growth and, if the release is insufficient, no egg cells will reach maturity. The sow will therefore not exhibit any in-heat behaviour. If the LH is released later, the egg cells will also begin to mature later and ovulation will also begin later. A smaller farrow can be the consequence of suboptimal maturing of the egg cells which results in a decreased number of released egg cells. Another reason for a small farrow is a high rate of embryonic mortality during the pregnancy as a result of poor embryonic development, an underdeveloped uterus, or an underdeveloped exchange between the sow and her embryos.

When these problems occur during early pregnancy, there is a high risk of the sow aborting her pregnancy. This occurs most often between the 20th and 25th day of the pregnancy and during the seasonal infertility period this is known as autumn losses. Several days later the sows will once again go into heat. When these problems occur later in the pregnancy, embryonic mortality occurs and the number of piglets born alive will decrease.
The seasons have a much greater effect on the fertility of gilts than on sows. This can be explained by the fact that gilts use more energy while lactating (increased weight loss) and are therefore more susceptible to factors which influence fertility after weaning (Prunier et al., 1996).

Seasonal infertility appears to be higher in farms where there are already fertility problems. Although seasonal infertility is not caused by illness or disease, illnesses such as flu and PRRS can increase the effects of seasonal infertility. The problems also appear to be greater on farms where new fertile, gilts are regularly introduced.

Length of the day/light

The shortening of the days influences the fertility of the sow and is generally seen as the main cause of seasonal infertility. Melatonin is a hormone which is influenced by the length of the day and the amount of light. Melatonin regulates the day rhythm and is released during the darker periods. This means that on shorter days (with many hours of darkness), a large amount of melatonin is released. A large release of melatonin stimulates the brain to produce fertility hormones so that egg cells mature and in-heat behaviour is exhibited. The day-night rhythm of melatonin has also been demonstrated in modern pigs, thus making melatonin a possible explanation for seasonal infertility. Indeed, the melatonin release is low during the summer period and as a consequence the release of reproductive hormones is not stimulated.
Research has been carried out regarding the duration of the light period and the light intensity and the occurrence of seasonal infertility. Research from Tast et al. (2001a) into the melatonin production showed that a high intensity of lighting during the day did not have any extra positive effects in decreasing the influences of the season. Nevertheless, low light intensity during the light period must be avoided as no melatonin is released during the dark periods when light intensity during the light period is low. This shows that light intensity has an influence on the day-night rhythm of the sows, but that it has no effect on the occurrence of seasonal infertility. Nevertheless, the duration of the light period in a day does have an influence. A light regime with 8 hours of light per day resulted in a higher percentage of sows going into heat within 10 days after weaning, a short interval between weaning and estrus when compared to a light regime of 16 hours of light per day (Prunier et al., 1994). No effects regarding farrow size or the number of weaned piglets were found.

Temperature

Not only the length of the day (light regime), but also the temperature plays an important role in the occurrence of seasonal infertility. In an experiment carried out by Prunier et al. (1994) a comparison was made between sows with a farrowing date in January (low temperatures) and a farrowing date in July (high temperatures). The percentage of sows which exhibited in-heat behaviour within 10 days after weaning was lower during the hot period. However, no effects regarding farrow size or the number of weaned piglets were found. Almond and Bilkei (2005) found an extended interval between weaning and estrus with temperatures above 35°C (2003: 7.8 vs. 5.9 days with temperatures lower than 30°C), higher percentage of sows returning to estrus at a regular interval (2003: 4.9 vs. 3.3%), a lower percentage of piglets born (79 vs. 92.1%) and a smaller farrow (8.4 vs. 10.9).
In Germany the effect of the temperature during covering on the percentage of piglets born was researched at 106 farms. When the stable temperature during insemination was lower than 30°C, the percentage of piglets born was found to be 82.7% (Schnippe, 2008).

Nevertheless, with a temperature above 30°C, the percentage of piglets born decreased to 79%. The effect of temperature was the highest with gilts (81.5% vs. 75.4%) and sows farrowing for the first time (78.7% vs. 70.6%) while no difference was found with multiparous sows (88.7% vs. 88.0%).
When the temperature during early pregnancy is high and results in heat stress, this can lead to negative effects in carrying the pregnancy to term as well as the number of vital embryos. During early pregnancy, a period in which the embryo develops quickly, high temperatures can retard the development, which can result in a smaller litter due to (partial) embryonic mortality. Temperature fluctuations, possibly with a draft, can also play an important role. In 2002 and 2003 for example there were many sows returning to estrus at irregular intervals in the Netherlands. During this period the day temperatures were very high, but during the nights in September the temperature went down to the freezing point. Geudeke and Gerritsen (2004) have shown that this factor may have played a role in the increased number of sows returning to estrus at irregular intervals during these periods. However there has still been no scientific research carried out into the possible role of temperature fluctuations (day-night difference) in the occurrence of seasonal infertility.

Diet

Diet has a great influence on the fertility of the sow and plays an indirect role in seasonal infertility. As a result of the high temperature, the sow will eat less. A low feed intake during lactation results in a greater loss of condition. As a consequence the release of the LH hormone during weaning will be slower which will result in an extended interval between weaning and estrus. The release of LH is stimulated by a high intake of feed in the previous pregnancy (most likely due to the sow being in better condition), a higher intake of feed during lactation, a high intake of amino acids during lactation and a high level of starch in the lactating sow feed. These diet factors therefore have a positive effect on shortening the interval, whereby the total feed intake during lactation has the greatest effect. The influence of diet during the interval on the length of the interval is less clear (for more information see circular SCH-2002-12). A low protein content in the feed during lactation lowers the insulin and LH production and thereby the maturing of the egg-cell. This results in a lengthened interval between weaning and estrus and a smaller litter. Increasing the amino acid content does not appear to have a positive influence on the size of the next litter (for more information see circular SCH-2002-12).
A decreased feed intake, for example due to a high temperature, also has negative effects during the early pregnancy and can lead to sows returning to estrus at irregular intervals. Two hormones are necessary in order to bring the pregnancy to term, progesterone and LH. The pregnancy may be aborted if the release of these hormones is reduced. A limitation in the feed intake in gilts during the first two weeks of pregnancy (1.8kg/d) resulted in a decreased release of LH during early pregnancy (Peltoniemi et al., 1997). In addition LH is related to the release of progesterone and a low LH release can thus lead to a decreased progesterone release and finally to the pregnancy being aborted.

Adding extra vitamins does not appear to have an effect on seasonal infertility. In an experiment carried out by Greer et al. (1987), the effect of extra vitamin C on the occurrence of seasonal infertility was examined. Adding 4 g of vitamin C per day had no effect on the interval between weaning and estrus, litter size, weight at weaning and the number of weaned piglets. Adding vitamin C thus has no effect on seasonal infertility.

There are no other studies which have researched the addition of vitamins and the effects on seasonal infertility. It is not necessary to add extra vitamins to premixes. The premix for breeding sows contains sufficient vitamins to meet the needs of the sows, including the interval period. Thus, no real effect can be expected from a vitamin supplement with a normal feed intake.

Conclusions and recommendations

- The length of the day and thereby the amount of light has a great influence on seasonal infertility. According to the welfare decision, a minimum of 8 hours of light is required. Research shows that too long a light period (16 hours) is detrimental to fertility. The advice is to not make the light periods too long.
- The ambient temperature is also important, try to keep the stable temperature low in the summer in order to decrease seasonal differences. In addition it is important to limit the difference in temperature between day and night. A ventilation system that is in good working order and well-programmed regulation equipment are a necessity.
- If the sows' feed intake is low during lactation, build the feeding schedule up a little more carefully after the piglets are born in order to avoid overeating and feed refusal in hot weather.
- Also try to limit temperature and lighting differences between stables in order to make transitions easier.
- Keep the internal heat production low by limiting FK (vNSP) and RP, ensure that there is sufficient IK (RC) in order to keep the passage speed in the gastrointestinal tract at the right level.
- The feed intake and therefore the condition of the sow influence fertility. Limit loss of condition in the farrowing stable. This can be done, for example, by not allowing too many piglets to suckle from a sow which has just had her first litter.
- A high feed intake during lactation can have a positive influence on the interval between weaning and estrus, the number of embryos and the maturing of these embryos.
- The chance that feed sticks to the silo giving mould the opportunity to grow is greater when there is a large difference between day and night temperatures. The use of organic acid (propshot = propionic acid) limits feed sticking in the silo, but it does not prevent it completely. Checking for sticking feed and mould remains necessary.
- Ensure there is enough fresh drinking water and a high flow rate of the nipple. Provide extra drinking water several days before giving birth and up until 4 or 5 days after.
- The effect of adding extra vitamins (above the normal dosage) remains virtually unresearched and it does not appear to have an influence.