

Improve milk quality and more cows will conceive

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During the past decade more evidence has come to light demonstrating the negative interaction between udder health and pregnancy outcomes. Because milk somatic cell count (SCC) is closely associated with inflammation and udder health, elevated SCC levels are a reliable indicator of subclinical mastitis.

The mechanism whereby elevated SCC reduces fertility is not completely understood. When mastitis is present, various substances produced in the mammary gland have adverse effects on the maturing follicle, egg, embryo and corpus luteum. Presence of elevated SCC or subclinical mastitis may suppress gonadotropin release leading to delayed postpartum resumption of estrous cycles.

FOLLICLE EFFECTS

The presence and intensity of chronic mastitis in one study was diagnosed by the combined evaluation of bacteriological examination and SCC in milk of individual quarters and characterized by a low, mild, intense or severe degree of infection (J. Dairy Sci. 95:1885-93). During the study, researchers made a count of visible follicles on each ovary.

The numbers of follicles with diameters ranging from 1 to 3 mm and 4 to 7 mm were not affected by the degree of infection, but as intensity of mastitis went up, the number of follicles with a diameter greater than 8 mm fell. Severely affected cows had fewer secondary follicles and reduced density of blood vessels in the outer cortical portions of the ovary.

A reduction of the vascular bed and additional fibrotic tissue together had a direct effect on egg-specific factors within the ovary. All these factors are essential regulatory elements of follicle function and growth.

POSTCALVING CYCLES

Cows contracting mastitis between Days 15 and 28 after calving had delayed onset of ovarian cyclicity (fewer ovulating by Day 28 postpartum) and delayed first estrus compared with cows having mastitis during the first two weeks of lactation and controls having no mastitis (Table 1).

In another study (Acta Vet. Hung. 59:349-362) high-SCC cows as defined by those with SCCs over 500,000 also had a greater incidence of delayed first ovulation postpartum than cows with SCCs under 500,000 during the first month postpartum. The results clearly indicated that mastitis can affect the resumption of ovarian activity in dairy cows.

ABNORMAL ESTROUS CYCLES

That wasn't the only negative impact found in that study. Cows with elevated SCC (200,000 to

500,000) had a greater incidence of prolonged estrous cycles than cows with an SCC of 50,000 to 100,000. Meanwhile, more premature luteolysis (short estrous cycles) were diagnosed in cows with gram-negative organisms and those with no detected pathogens in the udder compared with cows having gram-positive organisms or no infections (46.7 versus 8.3 and 2 percent, respectively; *Reprod. Domest. Anim.* 40:199-204). When a mastitis outbreak occurred during the follicular phase, the duration of this portion of the cycle was prolonged by three days in gram-negative cows and those with no detected pathogens compared with gram-positive mastitis and healthy cows.

It is clear that every effort made to reduce mastitis and elevated SCC will pay big dividends in more saleable milk and improved reproductive performance.

CONCEPTION RATE

The aim of a large seven-year Israeli study involving 287,192 first insemination records was to evaluate the effects of mastitis. In particular, researchers focused on the pattern and amount of SCC around first A.I. on conception rate. A SCC threshold of 150,000 cells was set to distinguish between uninfected cows and cows with mastitis. Accordingly, cows with high SCC before and low SCC after A.I. were designated as cured; those with low SCC before and high SCC after A.I. were designated as newly infected; and cows with high SCC before and after A.I. were designated as chronic (likely subclinical) mastitic cows. In all cases, conception was reduced compared with healthy control cows (Table 2).

What about cows with severe mastitis? A single elevation of SCC (greater than 1 million cells on only one milk test day) reduced the probability of conception by 23.6 percent when it occurred during the 10 days immediately before A.I., but not when it occurred earlier. Results indicated that SCC elevation around A.I., typical for subclinical mastitis, was associated with a significant reduction in probability of conception, and that even mild SCC elevation reduced conception rate.

Holstein cows (n = 1,001) from two commercial dairy farms in California were

retrospectively divided into four categories according to timing of first clinical mastitis case caused by environmental pathogens. Clinical cases of mastitis were identified at every milking by the herd personnel based on abnormal milk or swelling of the mammary gland.

Groups included:

1. Control with no recorded clinical cases of mastitis.
2. First clinical mastitis before first postpartum A.I.
3. First clinical mastitis between first postpartum A.I. and pregnancy diagnosis.
4. First clinical mastitis after pregnancy was diagnosed.

Mastitis reduced yields of milk, 3.5 percent fat-corrected milk and milk components. However, the effect was only observed for cows with mastitis before and soon after first A.I. All pregnancy outcomes were negatively affected when mastitis occurred soon after A.I. (Table 3).

Another study of 447 dairy cows from six dairy herds in Japan highlighted the relationship of elevated SCC with reproductive performance (*Acta Vet. Hung.* 59:349-362). Cows with an SCC of 200,000 to 500,000 also had reduced conception and pregnancy rates and more days from calving to conception than cows with an SCC of less than 200,000. Older cows (five or more calves) had a greater incidence of elevated SCC than cows in the first and second lactations.

GET TWICE THE BENEFITS

It is clear from these studies that every effort made to reduce mastitis and elevated SCC will pay big dividends in more saleable milk and improved reproductive performance. What can you and your team change in your management to reduce SCC?

	When mastitis occurred, days in milk		
	0 to 14	15 to 28	None
Days in milk	0 to 14	15 to 28	None
Days to first ovulation	33.4	38.6	32.0
Ovulating by day 28, %	47.5	22.2	50.3
Days to first estrus	80.2	90.7	83.9

Source: *Reprod. Domest. Anim.* 40:199-204.

Uninfected control cows	SCC changes relative to A.I.		
	Cured (high before and low after)	Newly Infected (low before and high after)	Chronic (high before and after)
39.4	36.6*	32.9*	31.5*

*Reduced (P < 0.05) conception rates compared with uninfected control cows.
Source: *J. Dairy Sci.* 94:4538-4545.

Item	Mastitis			
	None	Before A.I.	Soon after A.I.	After pregnancy diagnosis
Cows, no.	501	250	147	103
Conception at first A.I., %	29	22	10	38
Pregnant by 320 days in milk, %	85	72	59	93
Abortion, %	6	12	12	10

Source: *Anim. Reprod. Sci.* 80:31-45.