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Uterine involution in the dairy cow: Comparative study between organic and
conventional Dairy Cows

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Abstract

Organic dairying is growing in popularity in New Zealand and the demand for knowledge is ever increasing. Many more farmers are considering organics as an alternative to their current conventional system. However, limited information is available on organic dairying in a New Zealand pastoral situation particularly in relation to its effect on fertility.

The New Zealand dairy industry requires the dairy cow to become pregnant every year at the same time to maximise milk production and utilise the high pasture production in spring. A cow requires 40 to 60 days for uterine involution to occur and for resumption of oestrous cycles. It is critical that the cow becomes pregnant within the six to eight week mating period, however, this can be difficult for late calvers or those cows that had or still have a uterine infection, to undergo uterine involution and be successfully mated. These cows will often not become pregnant and as a consequence be culled for infertility.

During the first few weeks postpartum, the bacterial composition of the uterus fluctuates as a result of spontaneous contamination, elimination and recontamination. Most cows are able to eliminate these bacteria, however, 10 to 17% of cows are unable to do this. In these cows, the bacteria persist, cause infection and inflammation, and delay uterine involution.

The main objective of this present study was to investigate the effect of different management systems (Organic and Conventional) on productivity and reproduction, particularly the process of uterine involution and its relationship with reproductive outcomes. Uterine involution will be studied through the following measurements: cervical diameter as assessed by measurement per rectum, plasma concentrations of glucocorticoids and bacteriology of the uterus. Lactation characteristics: milk yield, cumulative milk yield, milksolids production and somatic cell count will also be investigated.

From the results, it can be concluded that Organic cows have reduced milk yield ($P=0.05$) and milksolids production ($P<0.01$) through there were no major differences at peak lactation or in the rate of decline after. However, overall somatic cell count was not affected by management system though the Conventional cows had high somatic cell counts in early lactation ($P=0.925$). Cervical diameter was affected by the management system with the difference between Organic and Conventional cows almost significant ($P=0.06$). Cortisol concentrations were significantly higher in Organic cows (0.68 ± 0.08 ng/ml) when compared to Conventional cows (0.95 ± 0.06 ng/ml) ($P=0.01$). Cortisol concentrations decreased over time postpartum ($P<0.01$). Additionally Organic cows had a shorter interval from calving to AI ($P=0.017$). However, none of the other reproductive outcomes were affected by management system.

Simple correlations established that reproductive outcomes and bacterial counts, reproductive outcomes and cortisol at Day seven, and cortisol and milk production characteristics, were not independent of each other. Aerobic bacterial counts on Day 28 and the interval from calving to AI were found to be significantly correlated ($r= 0.615$). Stepwise partial regression analysis, plus analysis of variance calculated on the relationships between uterine involution parameters and reproductive outcomes found multiple weak correlations. It found that cervical diameter, and aerobic and anaerobic bacterial counts on Day 28 were significantly correlated with the interval from calving to first AI ($P=0.018$).

The differences in lactation characteristics are related to the lower pasture production on the organic farmlet reducing the maximal potential milk production and the possibly earlier calving dates of the Conventional cows. The differences in bacterial counts and almost significant difference in cervical diameter may be related to the lower cortisol levels and thus suggest that the Organic cows may be less stressed. As stress suppresses the immune system, it may be possible that the higher bacterial counts are indicative of a less efficient or slightly weakened immune system which takes longer to eliminate bacteria in the uterus; however this

is open to conjecture. The shorter interval from calving to AI suggests that Organic cows may be exhibiting oestrus behaviour earlier postpartum or the Conventional cows are having “silent heats” but this difference is possibly related to human factors. The correlation between parameters of uterine involution and interval from calving to AI, and the lower values for uterine involution parameters in Organic cows suggest the possibility of faster uterine involution and this may result in better fertility in the Organic cows. More research needs to be carried out to further investigate the effect of organic dairying on uterine involution and reproduction outcomes but organic dairying at the very least does not negatively impact on uterine involution and fertility.

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