

Managing dairy cow immunity at calving to produce more milk

Parturition induces an innate immune response in dairy cows with an increase in inflammation and Reactive Oxygen Species production. The drop in circulating antioxidants at the end of the dry period makes this phenomenon even more acute.

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The intensity of the inflammatory response after parturition is negatively correlated to milk production. CCPA Group made several studies to evaluate the effects of a plant root (*Scutellaria baicalensis*) with recognised antioxidant and anti-inflammatory properties on the mammary cells and milk production.

Inflammation and milk production

CCPA Group measured oxidative stress using the D-ROM test and haptoglobin to evaluate the inflammation in two commercial farms around the calving period. The relation between milk production at four weeks and haptoglobin at seven days post-partum was significant in both farms. Production level in the farms was quite different but the correlation was nearly the same (see Fig. 1).

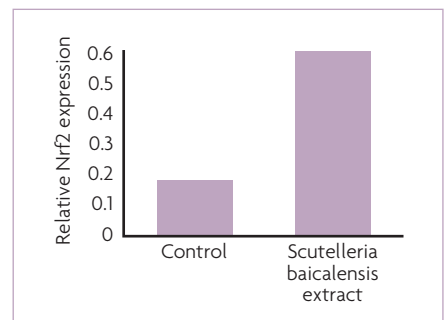
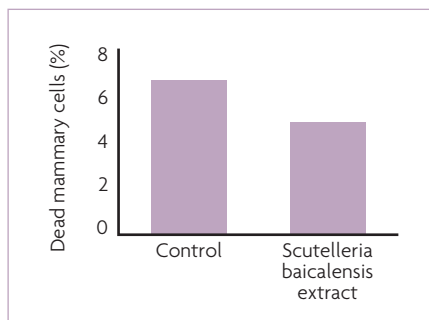


Fig. 2. The nuclear factor erythroid 2-related factor 2 (Nrf2) is a regulator of cellular resistance to oxidants.

Exploration of mammary cells

Natural plants containing specific active molecules have also been the subject of advanced research for their antioxidant and

anti-inflammatory activities. For instance, *Scutellaria baicalensis* is known to modulate the production of pro-inflammatory cytokines. Baicalin is regarded as the most abundant glycoside and determines the quality of *Scutellaria baicalensis*' bioactivity.

In order to investigate the mode of action of Baicalin on cell level, CCPA Group conducted an in vitro study to investigate the effects of Baicalin on bovine primary mammary epithelial cells.

This took place at the INRA (French public institute of agronomic research) facilities, with the team of Frederic Dessauge.

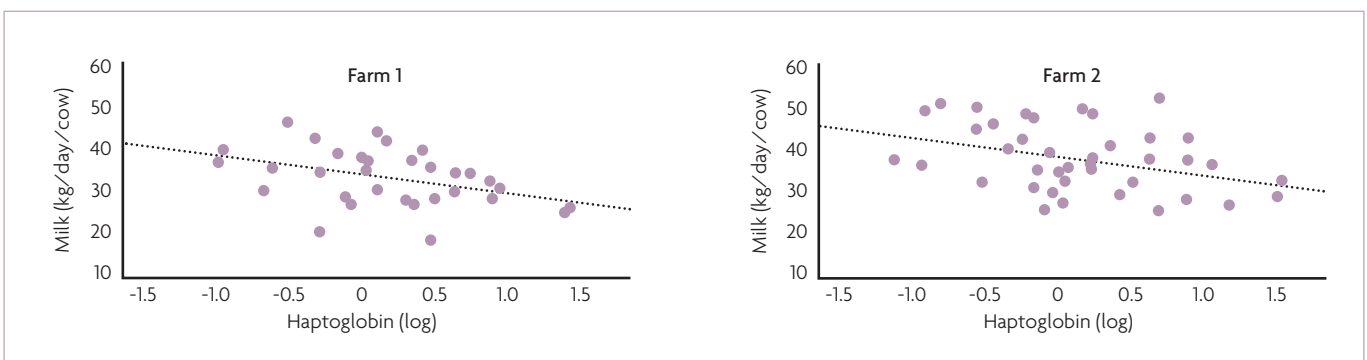
This experiment highlighted huge effects of Baicalin on several parameters.

The most spectacular effect was the ability of the active molecule of *Scutellaria* roots to protect cells against oxidative

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Fig. 1. Haptoglobin variation after calving (7 days) explained $\pm 15\%$ variation of production (Robert F, EAAP, 2014).



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stress through the activation of major anti-oxidative genes (Nrf2) (see Fig. 2).

Interestingly, mammary cell viability was also improved via a decrease of cells death. Because the milk production is directly dependant on the number of epithelial cells producing milk, it could therefore explain the good results obtained on milk production when using Scutellaria in dairy cow feed.

The first trial using Scutellaria baicalensis as a milk production improver was published at the EAAP congress in 2014. Some 24 cows were divided into two groups according to expected calving date, milk quality, parity, milk production at previous lactation for multiparous cows and genetic indexes for primiparous ones. The basal diet was corn, grass silage and concentrate. The trial group received supplementation with Scutellaria baicalensis extract for 60 days. Milk production was recorded during the whole lactation. The results of the trial demonstrated that the Scutellaria baicalensis extract significantly improved milk production by 5% (see Fig. 3). In addition, less sanitary disorders were recorded.

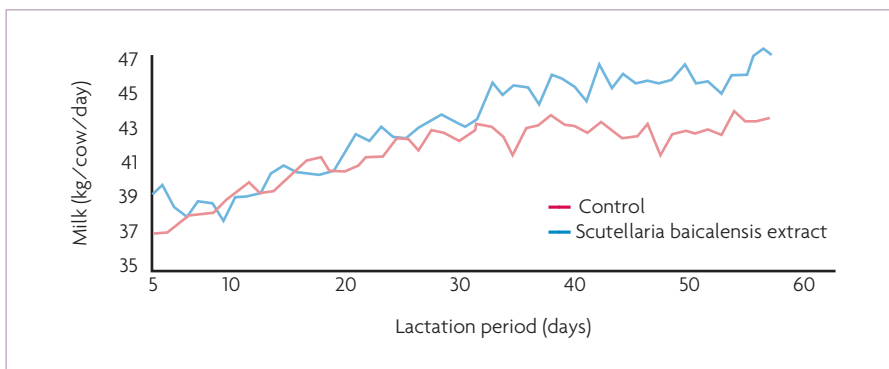


Fig. 3. The Scutellaria extract distributed during 60 days post-partum increases milk production.

A natural solution

CCPA developed a patented natural solution with Scutellaria roots and rigorously selected anti-oxidants

(green tea and grapeseeds extracts, protected C vitamin).

This new way of increasing milk production by managing the beginning of lactation and specially cell oxidation and inflammation sounds to be very promising.

Field applications show an average response in milk production from +2 to +5 litres. Moreover, we observed better reproductive performance (less services per conception) and less somatics cells in farms using Axion Start.

Axion Start can be incorporated in the feed using the concentrate form or diluted (100g/day/cow) for direct incorporation in the TMR.

The product has demonstrated a 7:1 return on investment. ■

References are available from the author on request