



## UNDERSTANDING THE MECHANISMS BEHIND



**Code 6965**

### Effects on the reduction of milk somatic cell counts

#### **The Impact of Somatic Cell Count on Dairy operations.**

Maintaining dairy cows in the herd by reducing disease and focusing on milk quality to capture quality premiums are especially important in today's tight dairy markets. Diseases, such as mastitis, are prevalent and expensive problems on dairy operations. Even on well-managed farms, chronic and clinical mastitis can be expected. The estimated costs of clinical mastitis range from about \$100 to \$140 per case (Hoblet *et al.*, 1991). In addition, mastitis lowers performance in many ways: reduced milk production, discarded milk, death and premature culling, decreased genetic advancement, and reduced milk quality. Reduced milk production accounts for approximately 70% of the total loss associated with mastitis. While good management and milking practices are the first lines of defense for promoting herd health and reducing disease, the special formulation of **XTRACT™** can be a supplementary strategy for lowering milk somatic cell counts.

#### **Somatic Cells as an Indicator of Mastitis**

Because mastitis is frequently subclinical or "hidden", a number of tests have been developed for the routine detection of mastitis. Most tests estimate the somatic cell count (SCC) of a milk sample. The term "somatic" means "derived from the body". All milk contains white blood cells known as leukocytes which constitute the majority of somatic cells. The cell count for "normal" milk is nearly always less than 200,000 cells/ml (lower for first lactation cows). Higher counts are considered abnormal and indicate probable infection. Higher counts are also associated with decreased production.

Leukocytes accumulate at the inflamed site to combat invading bacteria. Factors affecting the SCC level include age of cow, stage of lactation, season, stress, sanitation level and milk equipment facilities. A loose association has been made with the presence of urea, but these levels need to be unusually high for the irritating characteristics of urea to be observed.

#### **Proposed Mechanism of Reduction of SCC with **XTRACT™** Supplementation**

The mechanisms by which most commercial preparations based on plant extracts act to reduce milk somatic cell counts rests, at best, vague. Most suppliers try to make the indirect link with the reduction of levels of urea in the animal.

In general, inflammatory processes such as those which intervene in mastitis, are characterised by the activation of a specific class of cyclooxygenase enzyme, COX-2. COX-2 is differentiated from COX-1 in that it is specifically induced in cells by inflammatory mediators and produces prostanoids that contribute to inflammation. COX-2 has been shown to be activated by bacterial endotoxins (Janosi *et al.*, 1998) which correlate strongly to the prevalence of mastitis in ruminant animals. Many current objectives of anti-inflammatory strategies is by the direct inhibition of COX-2. Natural compounds such as those found in plants have been studied since 1999 to select for new candidates to the traditional anti-inflammatory steroid preparations. Screening of more than 300 plant extracts led to the discovery of only 3 or 4 with inhibitory activity against COX-2.

Eugenol and cinnamaldehyde were among those phytochemicals with the highest activity against COX-2. In specific COX-2 inhibition assays, eugenol and cinnamaldehyde were shown to singly inhibit COX-2 activities by 45% and 40%, respectively (Huss *et al.*, 2002). In that objective, the direct reduction (or inhibition) of the activation of COX-2 may underpin the effects of the feeding of eugenol and cinnamaldehyde (the two active ingredients of XTRACT) on the reduction of milk somatic cell counts.

### Somatic Cell Count Research Studies and Market Demonstrations

#### **Axiss France Trial 04RUM025: Effects of the feeding of XTRACT™ in TMRs on the levels of somatic cell counts in two genetic lines: Holstein-Freisan and Montbeliard.**

The effect of feeding XTRACT™ in TMRs was conducted in a EU-25 university with two different genetic lines of dairy cattle (Holstein-Freisan and Montbeliarde) over the first 14 weeks of lactation. A total of 32 cows of similar parity, milk production level, body condition, etc. was divided into two groups, a Control group fed a maize, barley and maize silage based TMR and the Experimental group fed the TMR with XTRACT at approximately 500 mg/head/day. The objective of this study was to determine the interaction between the genetics of the dairy cow and the feeding of XTRACT™ in TMR diets. Dry matter intake, milk production (morning and evening) as well as milk composition including somatic cell counts were measured over the 14-week trial period.

*Table 1. Milk somatic cell counts from 32 Holstein-Freisan Lactating Dairy Cows fed either a TMR or a TMR with XTRACT™ in the first 14 weeks of lactation*

	Control Group TMR	Experimental Group TMR + XTRACT™	SE
SCC, 1000/ml	452,950b	237,651a	316,579

a,b:

Source: University farm, EU-25, 2004.

*Table 2. Milk somatic cell counts from 32 Montbeliarde Lactating Dairy Cows fed either a TMR or a TMR with XTRACT™ in the first 14 weeks of lactation*

	Control Group TMR	Experimental Group TMR + XTRACT™	SE
SCC, 1000/ml	225,965	65,987	145,689

A,B:

Source: University farm, EU-25, 2004.

**Axiss France Trials 04RUM025-028 : Effects of XTRACT™ in Holstein herds**

A series of conducted demonstrations using XTRACT™ in grass diets were performed on private farms in Switzerland with herds up to 40 Holsteins in 2004. Feeding rate of XTRACT™ was at approximately 500 mg/head/day over 8 weeks in a protein concentrate. Each 4-week period was characterised by a 3-week adaptation period followed by a fourth week of sampling. Somatic cells counts were taken at morning and evening milkings on the same day of the fourth week. Results are summarised in Table 3.

*Table 3. Milk somatic cell counts in field trials conducted over 4 months weeks in dairy herds with about 200,000/ml somatic cell counts. Herds were fed either a protein concentrate or protein concentrate with XTRACT™ at 500 mg/head/day.*

	XTRACT™ in TMR for a period of:	Initial Somatic Cell Count	Final Somatic Cell Count
Farm 1	30 days	275,000b	183,000ab
Farm 2	30 days Additional 30 days	180,000b	130,000a 82,000a

a,ab,b: p<0.05

Source: Private farms, Switzerland, 2003/2004.

**Conclusions.** In 2 Swiss farm operations, the feeding of XTRACT™ over a one month period resulted in the significant reduction of milk somatic cells by more than half the original levels. Continued feeding over another month showed additional reductions in the two farms tested, with a significant effect in one farm in the subsequent period (Farm 2 above).

**Axiss France Trial 04RUM024: Effects of XTRACT™ in Holstein herds**

A dairy trial was commissioned in a experimental trial station in the USA evaluating the effects of XTRACT™ supplementation in TMR diets versus the TMR diet alone. Milk production and milk composition including somatic cell counts in Holstein cows characterized by a high number of days in milk (>178.5 days). A total of 32 cows with histories of greater than 178.5 days in milk production were divided in two groups and followed a feeding schedule over 100-days. Samples were taken over the last two weeks at morning and evening milkings and analysed for somatic cell counts.

*Table 4. Milk somatic cell counts in Holsteins in the second half of lactation fed a TMR with XTRACT™ at 400 mg/head/day.*

	Control Group TMR	Experimental Group TMR + XTRACT™	SE
SCC, number/ml	398,000B	264,000A	103,000

A,B: p<0.10

Source: Experimental trial station, USA, 2004.

*References are available upon request.*

For further information :  
Mailto : [info@pancosma.ch](mailto:info@pancosma.ch)