

GOOD NEWS ON NATURAL TRANS FATS

They are good for you

Everyone connected to the beef and dairy industries truly appreciates the biological uniqueness of the cow. She is capable of consuming rough forages and, because of her large rumen populated with billions of micro-organisms, convert the nutrients from the forage into high-quality meat and dairy products that people rely on as part of a healthful diet.

The microbial population in the rumen is the densest known to exist and the best at degrading plants. More than that, the micro-organisms are the catalysts in producing trans fats that are a natural part of ruminant meat and milk.

Scientists have shown that these natural trans fats are significant health boosters and quite different from industrial trans fats, which are created with high heat and pressure during the processing of partially hydrogenated vegetable oils and have been shown to be harmful to human health.

More than a decade ago, researchers began investigating the nutritional qualities of conjugated linoleic acid (CLA), a natural trans fat manufactured in the rumen during digestion that typically makes up two to nine per cent of the total fat content in the meat and milk. CLA was found to have beneficial effects by redistributing fat stores in the body, protecting against several types of cancer and improving dyslipidemia (high level of triglyceride and cholesterol circulating in the blood, which is a risk factor associated with cardiovascular disease).

Thanks to leading-edge research at the Metabolic and Cardiovascular Diseases (MCVD) lab under the direction of Dr. Spencer Proctor at the University of Alberta in Edmonton, we can now add another claim to ruminant fame — vaccinic acid (VA), which is also a natural trans fat.

"The health benefits of CLA have been extensively studied and this was the premise for the dairy and beef sectors' interest in exploring how to enrich CLA in ruminant fat as a nutraceutical," explains Dr. Flora Wang, post-doctorate fellow with the MCVD group. It was discovered that



Spencer Proctor

feeding cows a diet rich in polyunsaturated fatty acids, such as provided by sunflower or flax seeds, not only significantly increased the CLA, but also resulted in a three- to fourfold increase in VA. There can be three times more VA than CLA, making these two types of trans fats by far the most abundant trans fats in ruminant fat.

The evidence has researchers urging authorities to differentiate between natural and industrial trans fat on food labels

"However, at that time, VA's nutritional bioactivity was not known," Wang says. "It was not fully appreciated whether it was as bad as other trans fat, or to the contrary."

In 2008, Wang was the lead researcher on one of the first scientific papers published on VA's health effects. The study was supported by the Beef Information Centre, the Dairy Farmers of Canada, and the Alberta Livestock Development Fund in association with the Canadian CLA Network.

The three-week pre-clinical trial in rodent models genetically predisposed to developing diabetes and metabolic syndrome (due to the defect in the leptin receptor gene), showed that supple-



Flora Wang

mentation with purified synthetic VA reduced the level of triglyceride circulating in the blood by about 40 per cent. This indicates that VA has protective properties under a disease condition such as prediabetes, metabolic syndrome and dyslipidemia, Wang explains. In the healthy rodent models not predisposed to developing the diseases, VA was neutral, that is, it caused no harmful effects, but the protective action was not evident.

This was followed by a 16-week pre-clinical study that confirmed the previous findings and showed that a greater reduction of circulating triglyceride and LDL (bad) cholesterol and improvement in the dyslipidemic condition could be achieved with a longer course of VA supplementation.

The study also began to shed light on how VA interacts with the human body to produce the beneficial effects. The liver and the intestine are the two organs of interest because they play a substantial role in regulating fat metabolism, Wang explains. The study confirmed the hypothesis that VA alters fat metabolic pathways in dyslipidemic rats, including suppression of harmful enzymes that synthesize fatty acids in the liver and a type of fat called chylomicrons secreted from the intestines that potentially contributes to blocked arteries.

A third study from the same group demonstrated that the fat-lowering effects of the longer-term CLA supplementation could be enhanced with the addition of VA. Compared to the CLA diet, the VA-plus-CLA diet

resulted in a striking reduction of circulating triglycerides to the levels in the lean rats without dyslipidemia. This finding indicates that VA has lipid-lowering properties independent from CLA.

The latest study published in April involved researchers at the MCVD lab, the department of agriculture, food and nutritional science at the University of Alberta, the departments of plant science and applied microbiology and food science at the University of Saskatchewan, the Ag Canada research centres at Brandon and Lacombe and the faculty of pharmacy at the University of Manitoba.

It further investigated potential molecular pathways by which VA achieves beneficial effects, looking at how it promotes beneficial receptors and inhibits inflammatory compounds released by the liver and intestines under disease conditions.

This study also concluded that VA and CLA derived from ruminant fat as present in dairy and beef fats is more bioavailable to the human body than the synthetic VA used for the animal studies.

Wang says many environmental and dietary factors influence the level of natural trans fats in ruminant fat. Increasing the polyunsaturated fatty acid content of cattle diets will improve the natural trans fat profile in the meat and milk and, at the same time, reduce the level of saturated fat.

New natural trans fat message

Trans fat is a class of fats characterized by one or more double hydrogen bonds in a configuration known as trans. In short, the difference between natural trans fats produced by ruminant animals and industrial trans fats produced during processing is the number and location of the double bonds in the chemical structure of the molecules. According to Wang, simply the change in where the bond is located and the configuration of the double bond makes quite an amazing difference to how the molecules interact with the human body.

The growing pool of evidence from pre-clinical and a handful of clinical studies in several countries showing that natural trans fats do not have harmful effects and could be consumed as part of a balanced diet, has the research community urging authorities to differentiate between natural and

industrial trans fats on food labels and in health recommendations.

Dr. Proctor issued a public statement to this effect in May following the 10th Congress for the International Society for the Study of Fatty Acids and Lipids at Vancouver.

Labelling of trans fat content per serving on packaged foods was regulated in Canada in 2005 after the harmful health effects of industrial trans fats came to light. The U.S. and other countries followed suit the next year, while trans fat labelling in European countries is largely voluntary.

Recently, the definition of trans fat was adjusted in the international standard (Codex Alimentarius) to exclude all forms with a trans conjugated double bond. This recognized the health benefit of CLA, but didn't include VA, which has not only been shown to be one of the major trans fats in ruminant meat and milk, but the precursor to CLA in humans and animals. Up to 30 per cent of the VA people consume is naturally converted to CLA in their bodies.

Though CLA content is no longer

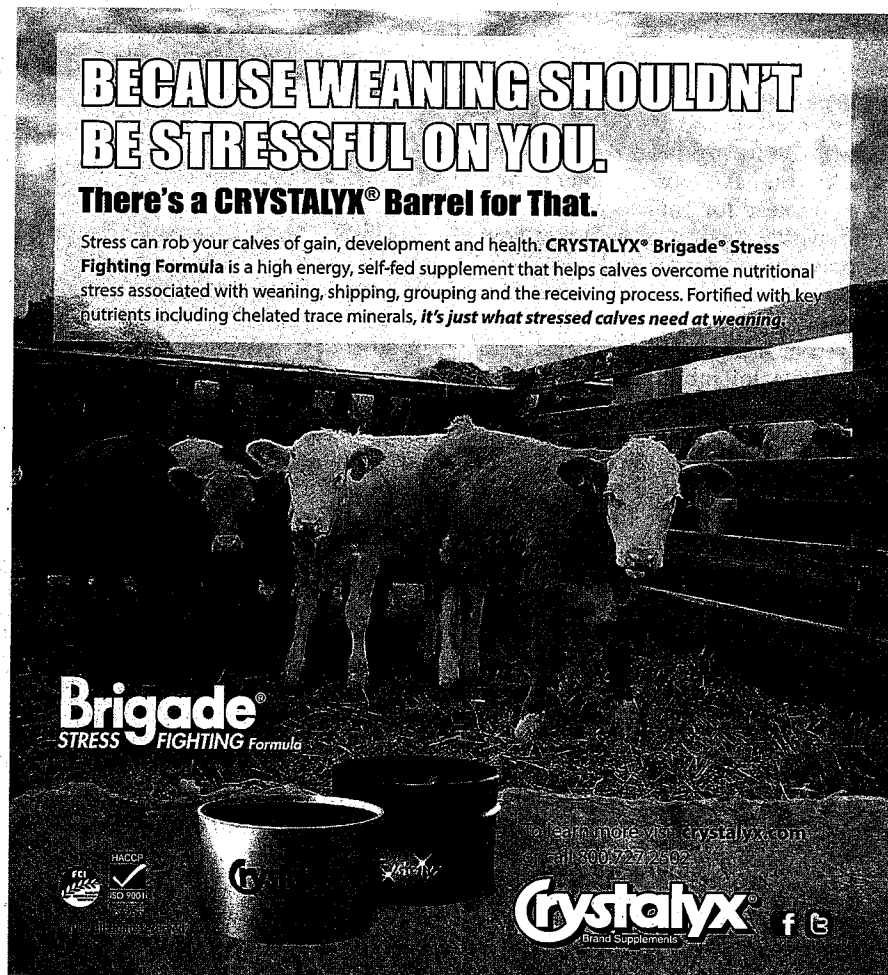
included in the total trans fats per serving on food labels in Canada, the U.S. and Denmark, the research community is advocating for further changes to exclude all ruminant-derived trans fats and for government officials to make it clear to consumers that not all trans fats are detrimental to their health.

In the meantime, they say the simplest way to determine whether food contains natural trans fats is to consider the source. If it comes from cattle, bison, sheep, goats or any other ruminant animal, it contains beneficial natural trans fats.

The University of Alberta, Alberta Meat and Livestock Agency, Canada Beef Inc., the Dairy Farmers of Canada and Alberta Milk have already launched a new website, www.naturaltransfats.ca, to get this message out to consumers.

For more information about natural trans fat research, visit the MCVD lab website at <http://mcvd.ualberta.ca/>, or contact Flora Wang at 780-248-1252.

— Debbie Furber 



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