Natural phytosterols stimulate increase in growth hormone secretion

Dioscin, a natural steroidal saponin found in many plants including fenugreek (Trigonella foenum-graecum) and yams (Dioscorea sp.) was recently found to increase release of growth hormone (GH) from the pituitary gland of rats. In this study, dioscin (10 µg/kg BW) administered intravenously to anaesthetized rats produced serum GH concentrations more than double that of controls. Dioscin (has a structural similarity to estrogen and is thought to increase GH production by binding to the receptor on pituitary cells which recognizes the hormone (GH releasing peptide) which is usually responsible for stimulating GH secretion. Increasing GH in circulation via supplementation results in increased strength and muscle mass in humans, increased milk production in dairy cattle, and increased body weight and fat-free mass in growing pigs.

Bovine growth hormone (BST) has received considerable attention for its ability to increase milk yield in dairy cattle, but is not permitted for commercial use in livestock in Canada. And increasingly there is public pressure to limit its use in other regulatory jurisdictions as well. Thus, feed ingredients containing stimulants for natural GH release may be an important addition to the livestock feeds list.

Interestingly, compounds which increase serum ghrelin (such as some phytoestrogens) also increase serum GH and may be good candidates for investigation as GH-releasing feeds in livestock.

References

Fenugreek
Improving feed efficiency

The seed of fenugreek is a common flavoring agent in livestock feed (Canadian Food Inspection Agency; Schedule V, Pt. 1 IFN# 8-01-856) and has a long history of therapeutic use as an appetite stimulant in humans. Fenugreek seed is used culturally to promote weight gain in Moroccan women, and an extract of the seed (33 mg/kg body weight/day) significantly increased feed intake and motivation to eat in rats. The appetite stimulant effect of fenugreek is considered to be at least partially associated with its steroidal saponin content – particularly diosgenin. An isolated steroidal saponin fraction of fenugreek seeds (42 mg/kg body weight/day) increased feed intake and motivation to eat in normal rats, and weight gain in diabetic rats. In humans, a single oral dose of a fenugreek leaf extract (40 mg/kg) resulted in feelings of hunger within 24 hours of receiving the extract. Scientific rationale for using fenugreek to increase feed intake and/or promote feed efficiency in animals. Effect of fenugreek on feed intake may be related to its well-documented ability to increase insulin sensitivity and, lower serum levels of low-density lipoproteins (LDL).
Insulin sensitivity and glucose metabolism are involved in the complex endocrine regulation of feeding behaviour. **Ghrelin is a hormone which stimulates feed intake.** Among the most important predictors for elevated serum ghrelin is insulin sensitivity\(^1\). Thus, dietary compounds which increase insulin sensitivity, such as fenugreek, would be predicted to increase serum concentrations of ghrelin. The biological activity of ghrelin in serum is dependent on its octanoylation status, such that the degradation form of ghrelin participates primarily in increasing appetite\(^12\) while the degradation form of ghrelin (desacyl ghrelin) has other effects, including inhibition of feed intake\(^13\). Enzymes responsible for degradation of ghrelin to desacyl ghrelin are those associated with lipoproteins, and mainly with LDL\(^11\). Thus, **dietary products which are able to influence the profile of serum lipoproteins in favour of high-density lipoprotein (HDL) and reducing LDL, such as fenugreek, will limit interactions of enzymes associated with LDL with ghrelin, thus reducing ghrelin degradation and sustaining appetite.**

### Studies in livestock

Fenugreek seed stimulates feed intake in dairy cattle, resulting in a significant increase in milk production\(^14\). The seeds also improve the composition of milk\(^15\). Fenugreek silage improves feed utilization in beef cattle\(^16\), possibly by improving the microbial environment in the rumen\(^17\).

### References