ANIMAL NUTRA Rx

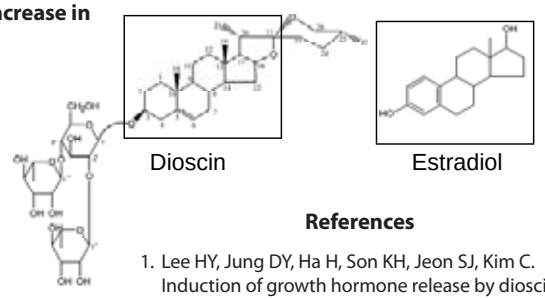
Veterinary Nutraceuticals in a Global Marketplace

Fall 2008
Volume 1
Issue 3

Research News

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[1]. 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[2], increased milk production in dairy cattle[3], and increased body weight and fat-free mass in growing pigs[4]. 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[5]) also increase serum GH[6] and may be good candidates for investigation as GH-releasing feeds in livestock.



Dioscin

Estradiol

References

1. Lee HY, Jung DY, Ha H, Son KH, Jeon SJ, Kim C. Induction of growth hormone release by dioscin from Dioscorea batatas DECNE. J Biochem Mol Biol. 2007 Nov 30;40(6):1016-20.
2. Graham MR, Baker JS, Evans P, Kicman A, Cowan D, Hullin D, Thomas N, Davies B. Physical effects of short-term recombinant human growth hormone administration in abstinent steroid dependency. Horm Res. 2008;69(6):343-54.
3. Collier RJ, Miller MA, McLaughlin CL, Johnson HD, Baile CA. Effects of recombinant bovine somatotropin (rbST) and season on plasma and milk insulin-like growth factors I (IGF-I) and II (IGF-II) in lactating dairy cows. Domest Anim Endocrinol. 2008 Jul;35(1):16-23.
4. Draghia-Akli R, Fiorotto ML. A new plasmid-mediated approach to supplement somatotropin production in pigs. J Anim Sci. 2004;82 E-Suppl:E264-269.
5. Ryökkynen A, Mustonen AM, Pyykönen T, Nieminen P. Endocrine and metabolic alterations in the mink (Mustela vison) due to chronic phytoestrogen exposure. Chemosphere. 2006 Sep;64(10):1753-60.
6. Rodríguez-Pacheco F, Luque RM, Tena-Sempere M, Malagón MM, Castaño JP. Ghrelin induces growth hormone secretion via a nitric oxide/cGMP signalling pathway. J Neuroendocrinol. 2008 Mar;20(3):406-12.

Upcoming Events

- **Sep 10-13, 08** British Equine Veterinary Association Congress (Liverpool, UK) http://www.beva.org.uk/node/299
- **Sep 22-24, 08** Innovet (Saint-Hyacinthe, Quebec) http://www.innovet.ca
- **Nov 9-14, 08** 4th World Congress on Medicinal and Aromatic Plants (Cape Town, South Africa) http://web.up.ac.za/default.asp?ipkCategoryID=4943&ArticleID=15
- **Nov 10-11, 08** Agriculture is Changing (AIC) 2008 Royal Agricultural Winter Fair (Toronto, ON) http://www.cantox.com/AIC/index.html
- **Dec 6-10, 08** 54th Annual Meeting of the American Association of Equine Practitioners (San Diego CA) http://www.aaep.org/convention.htm
- **Feb 17-19, 09** Southern States Cooperative "Advanced" Equine FeedMaster Program (Raleigh, North Carolina) mossbue@auburn.edu

Do you have some exciting research data on one of your products or an upcoming event?

Find out how you can highlight it in our newsletter by sending an email to agri@cantox.com.

Hot Off the Press...

- Pearson W, Orth MW, Lindinger MI. (in press) Reduced synovial fluid PGE_2 production in response to intra-articular IL-1 by horses receiving a dietary nutraceutical "Sasha's EQ", and safety of the product over 12-weeks. American Journal of Veterinary Research.
- Williams CA, Lamprecht ED. Some commonly fed herbs and other functional foods in equine nutrition: A review. Vet J. 2007 Aug 7. [Epub ahead of print]
- Quinn MJ, Moore ES, Thomson DU, Depenbusch BE, May ML, Higgins JJ, Carter JF, Drouillard JS. The effects of feeding flaxseed during the receiving period on morbidity, mortality, performance, and carcass characteristics of heifers. J Anim Sci. 2008 Jun 20. [Epub ahead of print html.]

This quarterly newsletter produced by Cantox Health Sciences International will keep you up-to-date on new research results, brief reviews of current research, and exciting events of interest to the global market for veterinary nutraceuticals. Email us with your research news, upcoming events and business news items at agri@cantox.com.

CANTOX® HEALTH SCIENCES INTERNATIONAL

Mini Review

Fenugreek (*Trigonella foenum-graecum*)

The seed of Fenugreek (

) is a common flavouring 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.[1] Fenugreek seed is used culturally to promote weight gain in Moroccan women,[2] and an extract of the seed (33 mg/kg body weight/day) significantly increased feed intake and motivation to eat in rats.[3] The appetite stimulant effect of fenugreek is considered to be at least partially associated with its steroidal saponin content – particularly diosgenin.[4] 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.[5] 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.[6]

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,[7,8] and lower serum levels of low-density lipoproteins (LDL).[9,10] 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.[11] 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 octanoylated 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.[12] 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

1. Blumenthal, M.; Busse, W.R.; Goldberg, A.; Gruenwald, J.; Hall, T.; Riggins, C.W.; Rister, R. (Eds.). 1998. The Complete German Commission E Monographs: Therapeutic Guide to Herbal Medicines. American Botanical Council; Austin, Texas [Sigrid Klein, Primary Translator].
2. Rguibi, M.; Belahsen, R. 2006. Fattening practices among Moroccan Saharawi women. East Mediterr Health J 12(5):619-624.
3. Petit, P.; Sauvaire, Y.; Ponsin, G.; Manteghetti, M.; Fave, A.; Ribes, G. 1993. Effects of a fenugreek seed extract on feeding behaviour in the rat: metabolic-endocrine correlates. Pharmacol Biochem Behav 45(2):369-374.
4. Bruneton, J. 1999. Pharmacognosy: Phytochemistry, Medicinal Plants (2nd Ed.). Intercept; London, Paris and New York.
5. Petit, P.R.; Sauvaire, Y.D.; Hillaire-Buys, D.M.; Leconte, O.M.; Baissac, Y.G.; Ponsin, G.R.; Ribes, G.R. 1995. Steroid saponins from fenugreek seeds: extraction, purification, and pharmacological investigation on feeding behavior and plasma cholesterol. Steroids 60(10):674-680.
6. Abdel-Barry, J.A.; Abdel-Hassan, I.A.; Jawad, A.M.; al-Hakiem, M.H. 2000. Hypoglycaemic effect of aqueous extract of the leaves of Trigonella foenum-graecum in healthy volunteers. East Mediterr Health J 6(1):83-88.
7. Gad, M.Z.; El-Sawalhi, M.M.; Ismail, M.F.; El-Tanbouly, N.D. 2006. Biochemical study of the anti-diabetic action of the Egyptian plants fenugreek and balanites. Mol Cell Biochem 281(1&2):173-183.
8. Hannan, J.M.A.; Ali, L.; Rokeya, B.; Khaleque, J.; Akhter, M.; Flatt, P.R.; Abdel-Wahab, Y.H.A. 2007. Soluble dietary fibre fraction of Trigonella foenum-graecum (fenugreek) seed improves glucose homeostasis in animal models of type 1 and type 2 diabetes by delaying carbohydrate digestion and absorption, and enhancing insulin action. Br J Nutr 97(3):514-521.
9. Sowmya, P.; Rajyalakshmi, P. 1999. Hypocholesterolemic effect of germinated fenugreek seeds in human subjects. Plant Foods Hum Nutr. 1999;53(4):359-65.
10. Hannan, J.M.; Rokeya, B.; Faruque, O.; Nahar, N.; Mosihuzzaman, M.; Azad, Khan, A.K.; Ali, L. 2003. Effect of soluble dietary fibre fraction of Trigonella foenum graecum on glycemic, insulinemic, lipidemic and platelet aggregation status of Type 2 diabetic model rats. J Ethnopharmacol 88(1):73-77.
11. Kempa, A.; Krzyzanowska-Swiniarska, B.; Miazgowski, T.; Pilarska, K. 2007. Not insulin but insulin sensitivity, leptin, and cortisol are major factors regulating serum acylated ghrelin level in healthy women. J Endocrinol Invest 30(8):659-665.
12. De Vriese, C.; Hacquebard, M.; Gregoire, F.; Carpentier, Y.; Delporte, C. 2007. Ghrelin interacts with human plasma lipoproteins. Endocrinology 148(5):2355-2362.
13. Asakawa, A.; Inui, A.; Fujimiya, M.; Sakamaki, R.; Shinfuku, N.; Ueta, Y. Meguid, M.M.; Kasuga, M. 2005. Stomach regulates energy balance via acylated ghrelin and desacyl ghrelin. Gut 54(1):18-24.
14. Tomar, K.S.; Singh, V.P.; Yadav, R.S. 1996. Effect of feeding maithy (Trigonella foenum-graecum) and chandrasoor (Lepidium sativum L.) seeds on milk and blood constituents of Murrah buffaloes. Indian J Anim Sci 66(11):1192-1193.
15. Shah, M.A.; Mir, P.S. 2004. Effect of dietary fenugreek seed on dairy cow performance and milk characteristics. Can J Anim Sci 84(4):725-729.
16. Okine, E.K.; Wang, Z.; Goonewardene, Z.; Mir, Z.; Liu, M.F. 2001. Residual metabolizable feed consumption as a method of comparing feed efficiency in steers fed silage and silage-grain diets. Anim Feed Sci Technol 92:87-93.
17. Goel, G.; Makkar, H.P.; Becker, K. 2008. Changes in microbial community structure, methanogenesis and rumen fermentation in response to saponin-rich fractions from different plant materials. J Appl Microbiol 105(3):770-777.

Regulatory News...

North America

August 2008

- President Bush signed the Animal Drug User Fee Amendments (ADUFA) of 2008 extending the expiry date from September 30, 2008 to 2013. This act entitles the FDA to collect fees in order to improve the performance of the new animal drug review process and ensure safety and efficacy of these products in animals and with regards to public health.
- FDA has extended the period in which it will receive comments on its final decision to prohibit extralabel use of cephalosporin in food production animals to November 1, 2008.
- Inverness Medical Innovations will manufacture, market and distribute, as granted in a license by the US Department of Agriculture (USDA), a veterinary test for avian influenza. This new test developed by Inverness Medical Innovations detects all strains and provides results in 15 minutes compared to older detection tests where results took weeks.

Europe

June 2008

- European Commission proposed new regulations for animal by-products that will maintain a high level of risk protection to public and animal health while facilitating the efficient management of animal by-products.

In Profile with...

Emerald Seed Products Ltd.

Emerald Seed Products Ltd. (ESP) was established in 1994 as a company focused on processing R&D and market development for Canadian produced fenugreek products. After more than a decade of R&D, ESP has established as the leading global company in fenugreek development.

ESP launched FenuLife® in 2001, which became the world's leading fenugreek extract for the nutraceutical industry. ESP made concurrent investments in regulatory approvals of ESP's fenugreek extracts for human nutrition, including achievement of GRAS status with the United States FDA. ESP's fenugreek product line also includes Canafen® Gum, utilized as a texturing food ingredient, and FenFiber®, a rich source of soluble dietary fibre.

Human studies and the 1000-year history of utilization of fenugreek as a feed supplement support interest in further research and utilization of fenugreek as a specialty feed supplement in North America. To this end, ESP developed Nutrifen® in 2008, a fenugreek concentrate containing all of the fenugreek's inherent health benefits for animal health and nutrition. ESP is currently developing Nutrifen® as a novel product to improve feed efficiency in poultry and beef, stimulate appetite in horses, increase milk yield in dairy cattle, and provide glycemic control in pet foods.