

11<sup>th</sup> International

# VETERINARY CONGRESS

July 02-03, 2018 Berlin, Germany

## Scope of unconventional feeds in India on rumen fermentation, methane inhibition, gastro intestinal nematodes and performance of the ruminants

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Indian farmers can neither spare land for feed and fodder production nor can they afford to buy expensive concentrates to feed their animals. Therefore, efficient utilization of land for forage production and utilization of unconventional and less utilized plant feed resources for ruminants are very important. The shortage of dry fodder, green fodder and concentrate is as high as 40% and fodder which is being cultivated in only 4% of the agricultural land which is not adequate to meet the requirement of fodder in the country. The figure compiled by National Dairy Development Board consultancy Service estimates the shortage of green fodder (36%), dry fodder (40%) and feed concentrates (57%). The scenario appears alarming in case of availability of quality fodder seeds since as per the estimates of NDDB, about 40,000 tons of fodder seeds are produced against a demand of about 5.4 lakh tons annually (MOA, Govt. of India, 1992). In such situation proper utilization of the available resources and finding the alternative to meet the demand of the feed is important. To focus on unconventional feed for its better utilization to increase productivity and performance is only option in hand. Generally, for ruminant feeding, there is no need of quality protein supplement in concentrate mixture. Because, the most of the protein present in feed is degraded into ammonia by rumen microorganism and converted into urea in liver and ultimately excreted through kidney, which result in total wastage of feeding costly protein. However, there is a minimum quantity of protein (40%) which is bypassed from the rumen, which gets degraded into amino acids in the lower digestive tract and utilized for synthesis of various classes of body protein. The present problem in the world is the emission of Green House Gases (GHG) by anthropogenic activity. Whilst CO<sub>2</sub> receives substantial attention as a possible cause of global warming, atmospheric concentrations of CH<sub>4</sub>, chlorofluorocarbons and N<sub>2</sub>O have markedly increased in the last 150 years and may be contributing to global warming, which is having an impact on many plant and animal species worldwide. Although the most dramatic effects are expected in the next decades when crop and forage yields might be reduced because of drought and extreme weather (Olesen and Bindi, 2002). This scenario might impair animal production, but also socio-economic vulnerability (IPCC, 2007). All these aspects of enteric CH<sub>4</sub> production have encouraged the scientific community to find out alternatives to mitigate GHG emissions. Whilst numerous chemical additives and antibiotics have been tested and used for this purpose, contemporary consumer demands orient towards the use of 'natural products' to alter rumen fermentation. Unconventional feeds containing bioactive products such as essential oils, saponin and tannin (Wallace et al., 2002) may be exploited as good feed supplements and to reduce CH<sub>4</sub> emissions in ruminant production system. Recently, these phytochemicals have been tested as natural additives to decrease CH<sub>4</sub> production (Patra and Saxena, 2009b). It was reported that the unconventional cakes viz. karanj (*Pongamia galabra*), neem seed (*Azadirachita indica*) cake, mustard oil cake (*Brassica indica*), mahua cake (*Madhuca latifolia*), cotton (*Gossium purpurium*) seed meal, castor (*Ricinus communis*) bean meal, jatropha (*Jatropha carcus*) meal and guar meal had varying effect on the GI Nematodes, Among eight oil cakes, the extracts of karanj (*Pongamia galabra*) and neem seed (*Azadirachita indica*) cake exhibited maximum effect (100% at 6 h in 80 mg/ml) on motility and mortality of *H. contortus*. (Anandan, 2008). Further, it is concluded that the feeding of karanj (*Pongamia galabra*) cake at 5% level may be used as functional feed to control the gastrointestinal nematodes in sheep. We have also studied these cakes at partial replacement of the conventional cakes on the ruminant performance. It was also observed that the inclusion of these cakes in the concentrate mixture lowers the cost of production. Therefore, it is concluded that these unconventional cakes can be included at a lower level for economical and better rumen fermentation and performance.

### Recent Publications

1. Anandan, R. (2008). M.V.Sc thesis submitted to IVRI Deemed university. IPCC. 2007. Summary of polymakers. In: Solomon, S., Quin, D., Manning, M., Chen, Z., Marquis, M., Averyt, K.B., Tignor, M. and Miller, H.L. (Eds.), Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, UK and New York, NY, USA.

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2. Patra, A.K. and Saxena, J. 2009a. A review of the effect and mode of action of saponins on microbial population and fermentation in the rumen and ruminant production. *Nutr. Res. Rev.*, 22: 204-219.
3. Patra, A.K. and Saxena, J. 2011. Exploitation of dietary tannins to improve rumen metabolism and ruminant nutrition. *J. Sci. Food Agric.*, 91: 24-37.
4. Olesen, J.E. and Bindi, M. 2002. Consequences of climate change for European agricultural productivity, land use and policy. *J. Agron.*, 16: 239-262.
5. Wallace, R.J., Arthaud, L. and Newbold, C.J. 1994. Influence of *Yucca schidigera* extract on ruminal ammonia concentration and ruminal micro-organisms. *Appl. Environ. Microbiol.*, 60: 1762-1767.

## Biography

S K Saha, PhD, FNAVS, Principal Scientists born on 1<sup>st</sup> November, 1967 in India and started his career as scientist in 1994 at Animal Science division, CARI, Port Blair, A & N islands. He served as a scientist for seven and half years in the CARI at Port Blair, where he worked on use of alternate available feeds in islands for livestock production, use of probiotics for livestock and poultry production, developed different feeding schedule for livestock and poultry, use of tree leaves for goat production. Presently, he is fully engaged in teaching, research and extension activities at IVRI. He is working in the area of unconventional feeds, its detoxification and utilization. He published many books and seventy research papers. He bagged many awards and recognition in his career. He has also visited USA and undergone training on mitigation strategies of methane production in ruminant at Iowa State University, Ames, USA. He is also recipient of Endeavour fellowship by the Govt. of Australia for post doctorate and guided many students as a major advisor.

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