The demand for meat in developing countries is on the increase and this trend is expected to continue over the years. The ability of poultry and rabbit to meet the animal protein demand in developing countries cannot be overemphasized. However, the main constraint limiting effective and efficient use of these choice animals is the high cost of traditional feed ingredients such as maize, soybean meal, fish meal and groundnut cake which are in strict competition with man’s dietary need. However, it is also becoming clear that the requirements for the traditional feed ingredients cannot be met, even according to optimistic forecasts. The gap between local supply and demand for these traditional ingredients is expected to widen over the coming decades, providing a compelling reason for exploring the usefulness of locally available, alternative feedstuffs in feed formulations. Alternative feedstuffs include, but not limited to, agro-industrial by-products and leaf meals of some common tropical plant species. They are good nutrient sources, but their use in animal production has been limited owing to constraints imposed by anti-nutritional and socio-economic factors. Protein from the leaf and seed meals of tropical plants is perhaps the most naturally abundant and cheapest source of plant protein. Several studies regarding the nutritive values of alternative feedstuffs and their usefulness in animal nutrition have been published. The effect of alternative feedstuffs based diets on some physiological parameters of rabbits and chickens have been reported by several authors. The use of alternative feedstuffs in rabbit and poultry diets and their effects on blood chemistry and haematology was reviewed. The review also covered their chemical compositions, economics and availability [Ogbuewu, I.P.*, Emenalom, O.O. and Okoli, I.C. (Department of Animal Science and Technology, Federal University of Technology, P.M.B.1526, Owerri, Nigeria), Comparative Clinical Pathology, 2015, 24, 1-10].

The nutrition of free-ranging bisons (Bison bison), house horses (Equus caballus), and camels (Camelus bactrianus) were investigated at their joint grazing on a forb-grass steppe pasture. The species composition of the consumed plants, the selectivity of food plants, and the digestibility of plant forage were assessed. Species of the consumed plants and their share in the diet were determined using the microhistologic analysis of faeces. The plant food selectivity was estimated by the ratio of the share of plant species in the diet of animals to their portion in the plant community of the pasture. The digestibility is calculated by the ratio of inert (undigested) components (silicon, lignin) in the diet and feces. In summer (June), these characteristics in horses and bisons were similar. Both species are typical animals consuming gramineous plants: the share of these plants in their diet is 81-83%, the selectivity of graminoids is equal (1.4), the digestibility of food is similar (49-51%). Camels differed from bisons and horses in all the characteristics of their food: forbs (mainly ruderal annual Bassia sedoides (43%) and Atriplex tatarica (20%)) predominated (86%); graminoids amounted to 14%. The selectivity index for forbs was 2.1, including 7.7 and 2.9. for Bassia and Atriplex, respectively. The digestibility coefficient (60%) was much higher in camels than in bisons and horses. Under joint grazing, species with different food selectivity (horse-camel or bison-camel) evenly affect the plant community of a pasture and preserve its species diversity [Abaturov, B.D., Kazmin, V.D. and Kolesnikov, M.P. (Severtsov Institute of Ecology and Evolution, Russian
NPARR, 7(1), 2016-30 A safety analysis of food waste-derived animal feeds from three typical conversion techniques in China

This study was based on the food waste to animal feed demonstration projects in China. A safety analysis of animal feeds from three typical treatment processes (i.e., fermentation, heat treatment, and coupled hydrothermal treatment and fermentation) was presented. The following factors are considered in this study: nutritive values characterized by organoleptic properties and general nutritional indices; the presence of bovine- and sheep-derived materials; microbiological indices for Salmonella, total coliform (TC), total aerobic plate counts (TAC), molds and yeast (MY), Staphylococcus aureus (SA), and Listeria; chemical contaminant indices for hazardous trace elements such as Cr, Cd, and As; and nitrite and organic contaminants such as aflatoxin B1 (AFB1) and hexachlorocyclohexane (HCH). The present study reveals that the feeds from all three conversion processes showed balanced nutritional content and retained a certain feed value. The microbiological indices and the chemical contaminant indices for HCH, dichlorodiphenyltrichloroethane (DDT), nitrite, and mercury all met pertinent feed standards; however, the presence of bovine- and sheep-derived materials and a few chemical contaminants such as Pb were close to or might exceed the legislation permitted values in animal feeding. From the view of treatment techniques, all feed retained part of the nutritional values of the food waste after the conversion processes. Controlled heat treatment can guarantee the inactivation of bacterial pathogens, but none of the three techniques can guarantee the absence of cattle- and sheep-derived materials and acceptable levels of certain contaminants. The results obtained in this research and the feedstuffs legislation related to animal feed indicated that food waste-derived feed could be considered an adequate alternative to be used in animal diets, while the feeding action should be changed with the different qualities of the products, such as restrictions on the application of ruminants, and recycling as formula feeds [Chen, T.*, Jin, Y. and Shen, D. (School of Environment Science and Engineering, Zhejiang Gongshang University, Hangzhou, China), Waste Management, 2015, 45, 9p].

NPARR, 7(1), 2016-31 Maternal flax seed diet during lactation changes adrenal function in adult male rat offspring

Flaxseed (Linum usitatissimum L.) has been a focus of interest in the field of functional foods because of its potential health benefits. However, authors hypothesised that maternal flaxseed intake during lactation could induce several metabolic dysfunctions in adult offspring. The present study aimed to characterise the adrenal function of adult offspring whose dams were supplemented with whole flaxseed during lactation. At birth, lactating Wistar rats were divided into two groups: rats from dams fed the flaxseed diet (FLAX) with 25 % of flaxseed and controls dams. Pups received standard diet after weaning and male offspring were killed at age 180 days old to collect blood and tissues. The body weight was evaluated and food intake during development, corticosteronaemia, adrenal catecholamine content, hepatic cholesterol, TAG and glycogen contentsuj and the protein expression of corticotropin-releasing hormone (CRH), adrenocorticotropic hormone (ACTH), 11-β-hydroxysteroid dehydrogenase type 1 (11β-HSD1) and adrenaline β2 receptor at postnatal day 180 (PN180). After weaning, pups from the FLAX group had a higher body weight (+10 %) and food intake (+10 %). At PN180, the FLAX offspring exhibited higher serum corticosterone (+48 %) and lower adrenal catecholamine (-23 %) contents, lower glycogen (-30 %), higher cholesterol (4-fold increase) and TAG (3-fold-increase) contents in the liver, and higher 11β-
HSD1 (+62 %) protein expression. Although the protein expression of hypothalamic CRH was unaffected, the FLAX offspring had lower protein expression of pituitary ACTH (-34 %). Therefore, induction of hypercorticosteronaemia by dietary flaxseed during lactation may be due to an increased hepatic activation of 11β-HSD1 and suppression of ACTH. The changes in the liver fat content of the FLAX group are suggestive of steatosis, in which hypercorticosteronaemia may play an important role. Thus, it is recommended that lactating women restrict the intake of flaxseed during lactation [Figueiredo, M.S., Da Conceição, E.P.S., De Oliveira, E., Lisboa, P.C. and De Moura, E.G. (Laboratory of Endocrine Physiology, Department of Physiological Sciences, Biology Institute, State University of Rio de Janeiro, 5º andar, Avenida 28 de setembro, 87, Rio de Janeiro, RJ, Brazil), British Journal of Nutrition, 2015, 114 (7), 1046-1053].

NPARR, 7(1), 2016-32 Seaweeds: A sustainable feed source for livestock and aquaculture

Utilization of seaweed as a feed supplement for animals is not a new phenomenon; in fact, it has been utilized by farmers as a valuable feed source for livestock and aquaculture for ages. This chapter addresses the worth of seaweed as a sustainable feed ingredient in diets of farm and aquatic animals. The chapter initially outlines the global feed market size and explains the importance of seaweed and its nutritional value according to animal nutrition requirements. Thereafter, a brief overview of in vivo studies that determine the effects of a seaweed supplemented diet on growth and product quality of pigs, cows, sheep, poultry, and fish is outlined. Subsequently, contributions of a seaweed formulated diet in improving the immunity and overall health of animals and reducing the environmental impact of emitted greenhouse gases by ruminants is discussed. Finally, opportunities and challenges of seaweed application in feed are addressed and some preliminary conclusions are drawn [Rajauria, G. (Department of Animal and Crop Sciences, School of Agriculture and Food Science, University College Dublin, Dublin, Ireland), Seaweed Sustainability: Food and Non-Food Applications, 2015, Pages 389-420].