

Research into Veterinary Aspects of Food Safety and Quality, and Animal Production Health at the University of Veterinary and Pharmaceutical Sciences in Brno

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Food safety and quality and animal production health have recently become major topics of veterinary research and the focus of several national, European and international grant agencies. Since 2005, the University of Veterinary and Pharmaceutical Sciences in Brno has been conducting two major projects in these areas. Both projects contribute to enhancing the quality of research at the university, and some results have been published in peer-reviewed international scientific journals included in the Citation Index database. Papers have also been published in *Acta Veterinaria Brno*, and those submitted for publication in 2007 form the basis for a special supplement dealing with veterinary aspects of food safety and quality, and animal production health.

Research project: “Veterinary aspects of food safety and quality”

This project is based on the comprehensive European concept of food safety. It has been methodologically divided into veterinary aspects of relevance to the following five areas: environmental conditions of raw foodstuff production; feed production and animal nutrition; animal production health, and animal protection and welfare; hygiene and food safety of products and foodstuffs; and veterinary protection of public health.

With regard to veterinary aspects of environmental conditions of raw foodstuff production, investigations are in progress into levels of contamination by selected organic pollutants and risk elements (Beklova et al. 2005, 2007; Penaz et al. 2005; Pikula et al. 2005a; Mikula and Svobodova 2006; Krizkova et al. 2007) and radionuclides (Dvorak et al. 2005, 2006a,b,c; Benova et al. 2007) in the environment. Some of the methodologies used for pollutant determination are also being investigated. In addition, the health status of some animal species occurring naturally in the environment used for feed production, animal rearing, and food production plants is also under investigation (Literak et al. 2005, 2006a,b; Pikula et al. 2005b; Bartova et al. 2006; Bochkov and Literak 2006; Hauptmanova et al. 2006a; Kopecna et al. 2006; Literak and Sitko 2006; Spitalska et al. 2006; Cizek et al. 2007).

In the area of veterinary aspects of feed production and animal nutrition, efforts are being made to identify suitable plant-based components to be substituted for animal-based components in feed mixes intended for laying hens, broilers, and pheasants, and also to test their efficacy. Research in this area particularly focuses on lupin (*Lupinus*) seed (Strakova et al. 2006a; Suchy et al. 2006b). Studies are also in progress to determine the possibility of supplementing poultry feed with clinoptilolites to increase performance and protect health (Suchy et al. 2006a). Other studies in this area include the effect of diet on the internal environment of animals and on aspects of the quality of products made from them (Večerek et al. 2005; Strakova et al. 2006b).

In the field of veterinary aspects of animal production health, and animal protection and welfare, the metabolism of animals intended for food, in relation to the quality and safety of animal products, is being investigated with particular emphasis on evaluating levels of selected substances in animal products intended for human consumption (Pechova et al. 2006a,b).

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Studies of the effects of some types of animal housing on the quality of poultry production, the effect of diet on the performance and health of animals intended for food, and the effect of diet on the level of animal production health, as evaluated by haematological and biochemical parameters, have been completed (Hauptmanova et al. 2006b; Pistekova et al. 2006; Svobodova et al. 2006a; Voslarova et al. 2006a; Dvorak et al. 2007).

Embryo-larval toxicity tests and their utility have been evaluated with respect to fish production health. Toxicity tests were conducted in quails and fish to determine the toxicity of extracts prepared from cyanobacterial biomass. The effect of water blooms of cyanobacteria on amino acids and fatty acids has been studied in fish (Krejci and Palikova 2006; Palikova and Krejci 2006; Palikova et al. 2007; Skocovska et al. 2007).

Factors inducing stress in animals intended for food have also been studied. This research focused on stress indicators in animals intended for food. Other studies have dealt with the transport and pre-slaughter handling of animals. These have included the effects of travel distance and season on transport-induced mortality in fattened cattle, dairy cows, calves, pigs, broilers, and turkeys; the levels of stress in poultry and pheasants at different packing densities during transport, stress due to transport, transport-induced stress in fish (carps); and stress in poultry resulting from shackling before slaughter. Research results have been published by Bedanova et al. (2006, 2007a,b), Blahova et al. (2007), Dobsikova et al. (2006a), Malena et al. (2006), Suchy et al. (2007), Vecerek et al. (2006a,b,c,d), and Voslarova et al. (2006b,c, 2007).

Research on veterinary aspects of hygiene and safety of products and foodstuffs has focused on pathogenic microorganisms, particularly with respect to the collection, isolation, typing and identification of species and on antibiotic resistance. Studies of bacteria and food safety have included *Campylobacter* and *Yersinia*, as well as others, and their survival rates in connection with potential risks for food-borne diseases transmission. Research has also been conducted to identify the phenotype for resistance to antibacterial substances in selected isolates of pathogenic microorganisms, and has utilized PCR methods to detect the selected resistance-coding genes, and to monitor the occurrence of bacterial toxins in selected foods. These results have been published in papers by Cupakova et al. (2005), Kolackova and Karpiskova (2005), Nebola and Steinhäuserova (2006), Steinhäuserova et al. (2005, 2007), and Vazlerova and Steinhäuserova (2006).

Within the evaluation of chemical parameters of food safety, levels of biogenic amines in selected commodities were assessed with regard to the conditions of food treatment in fish. Levels of selected substances in fish, meat products, and honey were assessed with respect to specific technological procedures, and oxidative processes were investigated in selected foodstuffs in research reported by Halamickova et al. (2006), Kordiovská et al. (2006), Marsalek and Svobodova (2006), Marsalek et al. (2005, 2006), Vorlova et al. (2005).

Additionally, chemical parameters indicating the quality of animal products (milk, honey) with regard to some technological processes were determined (Navratilova et al. 2006a,b; Vorlova et al. 2006). Quality parameters in meat from carp and tench hybrid lines under varying treatment conditions were assessed (Buchtova et al. 2005a,b, 2006a,b; Buchtova 2007). Proteolytic activity of *B. cereus* in milk was also studied (Janstova et al. 2006a,b).

Food adulteration assessment included the use of microscopy, histology and image analysis to demonstrate the presence of some of the components characteristic of food adulteration (Tremlova et al. 2006a,b).

Within the field of veterinary protection of public health, risks originating from the meat and organs of animals intended for food production were assessed and analysed, particularly from poultry (Celechovska et al. 2005; Mikulicova et al. 2005).

Risks to humans from the aquatic environment were defined with respect to possible effect on food safety and quality. The impact of certain contaminants in the aquatic environment on the health of fish was evaluated with respect to food safety. The effects

of some pollutants in the aquatic environment were modelled experimentally in fish or evaluated by using embryo-larval toxicity tests (cypermethrin, deltamethrin, bisphenol A, 17-beta-estradiol, propylparaben, nitrites, chlorides). The results appeared in papers published by Drastichova et al. (2005), Pistekova et al. (2005), Svobodova et al. (2005, 2006b), Dobsikova et al. (2006b), Kroupova et al. (2006), Mikula et al. (2006), Velisek et al. (2006a,b, 2007), and Voslarova et al. (2006d).

Research project: “Active enhancement of health, performance and utility of animals”

The main aim of this project is to gain deeper insight into the modification of metabolism and reproductive capacities of ruminants, pigs, and horses with the intent of enhancing health, performance, and utility.

Research concerning the active enhancement of health and production performance in cattle and small ruminants investigated the effect of selenium and chromium metabolism on the internal environment of ruminants, the effect of diet in dairy cows and calves on production performance, and the diagnosis of certain diseases. Papers in this area were published by Gopfert et al. (2006), Komprda et al. (2005), Pavlata et al. (2005), Pechova and Pavlata (2007), Pechova et al. (2005), Zendulkova et al. (2007).

Research into the active enhancement of health and performance in pigs investigated the role of iron on health and production performance in pigs, particularly with respect to its absorption, metabolism, and utilization, and also its impact on immunity and the animal's internal environment. Papers addressing this topic were published particularly by Svoboda et al. (2005a,b,c, 2007) and Zelnickova et al. (2006).

Research concerning methods of improving health and increasing performance in horses, particularly investigated the relationship between selenium supplementation and the occurrence of myopathies in horses. Major diseases of the digestive system and the occurrence of some blood disorders in horses were also investigated. Papers in this area were published by Bezdekova et al. (2006, 2007), Jahn et al. (2006), Ludvikova et al. (2005a,b, 2007), Mezerova et al. (2006).

Research regarding enhancement of reproduction in ruminants, pigs and horses focused on methods that affect follicle development, ovulation, and *in vivo* and *in vitro* embryo production. This topic was addressed in papers by Hartman et al. (2006) and Lopatarova et al. (2006).

Research supported by these two projects at the University of Veterinary and Pharmaceutical Sciences in Brno is contributing to broadening scientific knowledge in the area of veterinary aspects of food safety and quality, and animal production health.

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