

Pig welfare: the animal point of view, biological and behavioural approaches

By P. Mormède, A. Foury and M.-C. Meunier-Salaün (*communication p.191*)

Welfare refers to the subjective psychological state of an individual regarding his internal and external environment. Since we are not yet able to read directly animal emotions and feelings, we have no other option than to infer them from the analysis of objective signs, particularly physiological and behavioural, based on the psychobiology of emotion, stress and adaptation. The activation of neuroendocrine stress systems (adrenocortical axis and sympathetic nervous system) provides numerous markers to study biological responses to environmental factors. However, their interpretation in terms of welfare must take into account the important role of these systems in the body's general physiology. Behavioural criteria are also used (analysis of time budget and space use, abnormal behaviours, expression of social links, preference tests), and interpreted in the context of applied ethology.

Key words: animal welfare, stress, adaptation, psychobiology, applied ethology, pig.

Pig welfare: livestock economist point of view

By C. Gourmelen, K. Latouche and P. Chevillon (*communication p. 205*)

Our society demands welfare, but in varied forms driven by complex and paradoxical individual behaviours. The 2001 European Union Directive requires that sows are kept in groups, and that the space per sow is increased while keeping them on fully slatted floors. However, the meat produced under these standards does not seem to be synonymous of higher technological quality, with a processing rate of 70%. In addition, the implementation of these regulations produces extra costs for the breeder, estimated between 0.57 and 1.3 € centimes per kilo of carcass. Should space requirements for animals at different stages increase further, as suggested by the latest EFSA expert report, the impact could rise to 3.9 cents. An INRA study showed that only a small proportion of consumers would be willing to pay more for pig meat produced with improved welfare conditions. This raises the question of unfair competition from non-EU Member states that do not follow the same rules and produce cheaper pig meat.

Key words: animal welfare, production extra-cost, meat quality, willingness of consumers to pay, unfair competition.

Animal welfare, a driving force to change pig production systems?

By J.-Y. Dourmad, A. Carpentier, B. Lebret and M.-C. Meunier-Salaün (*communication p.213*)

Animal welfare requirements are expected to affect the future development of pig production systems in France. Rules and regulations play a major role, as they may promote the development of larger farms, better able to sustain their economic burden. The schedule of conditions of alternative production systems includes improved animal welfare. However, french consumer demand for this type of production remains very low due to higher prices. On the other hand, simultaneous improvement of animal performance and welfare provides an interesting approach, as the price increase due to the welfare-related cost may be at least partly offset by enhanced animal performance.

Key words: animal welfare, pig, livestock systems, economy.

The welfare of laying hens: biology and regulation

By A. Fabre de Loye (*communication p. 219*)

The welfare of laying hens is one of the old topics which features regularly in discussions on European animal welfare regulations. The texts adopted are a compromise between scientific arguments based on biological data, and economical and geopolitical factors. Laying hens are a textbook example, as none of the systems recommended by current national and international regulations, meets fully the requirements of the animals or of the consumers. The arrival of ten new Member states into the European Union has changed both the geopolitical balance presiding over the creation of these regulations, and the importance given to animal welfare in the Common Agricultural Policy. This topic is also acquiring a worldwide status through the World Organisation for Animal Health. Furthermore, the current threat from avian influenza reminds us that the health aspect cannot be ignored.

Key words: animal welfare, laying hens, ethology, European institutions, animal protection.

The European food hygiene package: limits and prospects

By X. Delomez (*communication p. 227*)

The implementation of a coherent series of regulations has harmonised the European set of laws on food safety. However, the author shows that, although far-reaching, these regulations do not cover the whole issue, and that Member states still need to rely on national measures. Some changes are going to have to be brought to the French criminal law. The author suggests the implementation of administrative penalties against the most technical breaches.

Key words: veterinary public health, food safety, Community regulations, criminal penalties.

Equine abortions: review of a three-year study in Calvados (France)

By G. Fortier, A. Léon, J. Tapprest, P.-H. Pitel and S. Pronost (*communication p. 235*)

*Specialist laboratories in Lower Normandy found that approximately 25% of equine abortions are of unknown aetiology. The objective of the present study was to improve diagnostic tools on aborted fetuses using sensitive and specific molecular biology methods, and to evaluate the impact of pathogens so far given little consideration in equine abortion studies. The chosen protocol included DNA and RNA extractions from different foetal organs and placenta, as well as the storage of foetal tissues for pathology analyses. We present here preliminary PCR results identifying a few abortion-inducing pathogens, and the first French results on *Leptospira*, viral arteritis virus and *Neospora caninum* obtained from over 400 fetuses. Herpesviruses remain the main pathogens detected, due to improved detection methods (5%), whereas *Leptospira*, *Neospora caninum* and the EVA virus together account for 2.25% of newly identified cases. Further analyses on other pathogens are ongoing. This study is expected to reduce to less than 15% the rate of equine abortions of unknown origin.*

Key words: horse, infectious abortion, molecular biology, PCR.

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Key words: horse, infectious abortion, molecular biology, PCR.

Pennhip: an early diagnosis and eradication method of canine hip dysplasia

By A. Madélnat, L. Guénégo and R. Gautier (*communication p. 241*)

Pennhip (University of Pennsylvania Hip Improvement Program) is a radiographic method for very early diagnosis (at 4 months) of canine hip dysplasia. A distraction index is calculated to predict the onset of degenerative joint disease in the adult dog. This index, used to select dogs for reproduction programs, should help eradicate canine hip dysplasia after a few generations, an objective that official programs in many countries have not achieved in forty years.

Key words: Pennhip, dysplasia, hip, dog, distraction index, radiography.

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Key words: Pennhip, dysplasia, hip, dog, distraction index, radiography.

Interstitial cells of Cajal: histological and pathophysiological studies. The story of a still mysterious cell in the 21st century...

F. Bernex (*communication p.247*)

At the end of the 19th century, Cajal discovered elongated cells with numerous thin ramified cytoplasmic processes located between the muscle layers of the gastrointestinal tract. These interstitial cells kept their secrets for a long time, as Cajal's coloration was difficult to reproduce. The arrival of the transmission electron microscope in the 20th century resulted in the ultrastructural characterization of interstitial cells of Cajal, and molecular biology is now used for their routine detection. An immunohistochemical technique is able to detect the KIT receptors with tyrosine kinase activity on the cell membrane. The discovery of this protein helped understand several functions of the interstitial cells of Cajal in digestive motility, and initiated the development of a new therapeutic class known as tyrosine kinase inhibitors.

Key words: ICC, smooth muscle cell, *Kit*^{WlacZ} mutation, pacemaker activity, slow waves, digestive disorders, GIST, Imatinib, Gleevec.

Control of organ sizes: genetics and pathophysiology of intestinal lengthening in mice

By J.-J. Panthier, G. Houzelstein and S. Bellier (*communication p.255*)

The mechanisms controlling the body size of adult mammals are well known. By contrast, even though zoologists have examined this question since the 19th century, little is still known on the mechanisms controlling the size of organs or tissues. The study of variants in mice, obtained either spontaneously or generated on purpose, could provide a lead to understand and dissect these mechanisms. This paper shows through a few chosen examples the conceptual and practical difficulties associated with this strategy.

Key words: law of coexistence, tinkering, myostatin, FGFR3, PRM/Alf, digestive tract, electrical slow waves, interstitial cells of Cajal.

Bacterial biofilms

By A. roux and J.-M. Ghigo (*communication p.261*)

Biofilms are heterogeneous structures containing bacterial populations enclosed in an extracellular matrix attached to various surfaces. Different techniques, described in the present article, were used to create a model for the development of biofilms in five stages: reversible adhesion to a surface of bacteria in the plankton phase, irreversibility of the adhesion due to the synthesis of structures on the bacterial surface, formation of microcolonies, development of these microcolonies producing the maturation stage, and finally colonisation of new surfaces. Metabolic cooperation between cells and information exchanges based on a mechanism called Quorum-sensing are also described. Biofilms are known for their negative aspect in health and industrial sectors, but they also play a crucial ecological role and contribute widely to the functioning of most ecosystems, particularly that of the carbon cycle and the water cycle.

Key words: biofilm, structure, development, health, industry, ecology.