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Session 31 Theatre 2

Design of future dairy farming systems

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Future dairy farming systems should be designed to integrate grazing cows, animal and public welfare, environment, landscape and profitability. Innovations such as free-walk housing systems, mobile milking systems and the use of intelligent software can make different dairy farm systems more sustainable. A free-walk housing system has no cubicles. The extra space enables cattle to express their natural behaviour. The lying area can be made with anorganic bedding material like sand or plastic or with organic material such as compost or dried manure. In Minnesota (USA) much experience has been gained with compost dairy barns and in Israel with dried manure. Research is under way with free-walk housing systems using a variety of bedding materials. Cow comfort, emissions of ammonia and green house gasses will be measured as well as the economical consequences. Cows graze less in the Netherlands because farms are getting bigger and integration with an automatic milking system is becoming increasingly difficult. Therefore we are developing mobile milking systems to make grazing possible on larger farms and to follow dairy cattle in large nature areas. Recent developments in intelligent software have the potential to improve dairy management in all type of farming systems. For example introduction of Dynamic Linear Modeling (DLM) has provided a new self learning dynamic feeding system which enables economy of feed costs by indicating both efficient and less efficient cows.

Session 31 Theatre 3

Innovative Ideas of multifunctional land use in the global context

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Agriculture is the main reason of land use. The challenge is to develop sustainable land use systems in the context of superior importance and multi-functionality. Sustainable land use must integrate economics, ecology and social aspects and consider international commitments and globalisation. Natural and human resources define the land use patterns and potential. Innovative ideas are needed to create the land use of the future. GM-cropping is not the only new trend. In the last decades some ideas have influenced agriculture and land use as well: - Low input farming systems with added values, e.g., organic farming, PDO-production - Ethical farming, e.g., animal welfare on farms, historical/traditional farming - Non-food biomass production, e.g., energy and raw material goods - Agro-environmental schemes, e.g., maintenance of landscapes and biotopes - Educational and therapeutic agriculture, e.g., school farms, farming with handicaps These innovative ideas show that agricultural development with increasing food production through increasing input, intensification and specialisation is not the only route to go. Particularly in developed countries, these innovative land use pattern play an important role - last but not least for the image of farming. Many of these pattern have been developed by farmers and non-farmers in the western world. These innovations ask for adaptations to be economical applicable to other environments and societies.

Session 31 Theatre 4

Optimization of insemination decisions and value of pregnancy in dairy cattle

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Objective was to optimize insemination decisions for individual dairy cows and determine value of pregnancy. Currently, dairy farmers in the USA tend to not consider differences in individual animal performance when making decisions about the breeding period for nonpregnant cows. A more accurate computer program based on dynamic programming was developed. Innovative is that individual cow performance, such as future milk production, in the current lactation can be much more accurately taken into account than in the past. Consequently, the optimal decisions for some cows may be significantly different from those of earlier optimization programs and from current practice. Under typical assumptions for herds in the USA, optimal intervals to conception for average first and second parity cows were 133 and 112 days, respectively. Cows that produced 15% more milk had intervals of 169 and 140 days. Optimal average intervals to first insemination were 77 and 70 days for first and second parity cows but cows that produced 15% more milk had intervals of 99 and 77 days, respectively. Lower producing cows had shorter intervals. Costs per day earlier or later were negative before the optimum but increased to more than $4 later in lactation, depending on individual cow performance. Insemination values ranged from less than $0 to more than $200. New pregnancy values ranged from less than $0 to more than $800. The improvement in accuracy is an important step towards more realistic and practical computerized decision support on large dairy farms and will improve efficient and profitable dairy farming.

Session 31 Theatre 5

A cost effectiveness approach to identify cheap and accurate indicators to assess livestock impact on biodiversity

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During the last 20 years, numerous agro-environmental indicators have been developed and combined into models to assess the impact of livestock on biodiversity and to monitor agro-environmental policies. Surprisingly, most studies on indicators do not explicitly mention accuracy and cost as desirable properties. This paper reports the results of a study aimed at (i) measuring the accuracy and cost of a wide range of indicators combined into models for the assessment of livestock impact on biodiversity and (ii) discussing their usefulness on the basis their cost and accuracy. Nine model selection procedures (MS) and two cross validation techniques (CV) were used to combine two types of biodiversity indicators (stocking rate and sward characteristic) measured on 252 grazed plots during two years. Sensitivity, specificity, and probability of correctly ranking plots were estimated for each model. Results showed that MS and CV had low influence on accuracy. Accuracy and cost of models were mainly influenced by the type of indicators. Models based on stocking rate indicators only were less accurate (-8%) than those based on sward characteristics but they had the lowest cost (531 versus 2495 €) with a satisfactory discriminatory ability (c. 75%). This statistical method could support researchers, farm advisers, and decision makers in comparing various indicators.

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