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Farm Survey on the Use of Electronics and IT in Agriculture

In summer 2006, Agroscope Reckenholz-Tänikon Research Station ART and the Swiss College for Agriculture (SHL) carried out a farm survey in order to obtain more information on the use of electronics and information technology (IT) in Swiss agriculture. The aim of the survey was to analyze the use of electronics and IT in crop farming, dairy and pig production and farm management and to draw conclusions regarding farmer satisfaction, their needs and technological requirements. Satisfaction with technology is generally high; potential for optimization exists in the reliability of individual components, as well as in training.

In today's modern agriculture, many applications with electronics and information technology (IT) are used. Electronic components control, for example, engine, transmission and hydraulic functions, and crop farming is planned and documented with the agricultural field record on the computer. Herd management systems in dairy production are also based on a complex network of IT applications which record, evaluate and influence animal performance. To date, more detailed information on the use of and satisfaction with this technology has not been available in Switzerland.

Method

Survey participants were selected for representativeness in order to obtain a statement as broad as possible on the use or non-use of electronics and IT applications in agriculture. A questionnaire with 18 questions and a total of over 100 sub-items on the subject of electronics in agriculture was delivered to 1000 farms in Switzerland, and 324 returned questionnaires were evaluated [1].

Utilisation

One-third of the surveyed participants use electronic hoist gear control on their tractors;

the use of other components lags some distance behind. In dairy and pig production, the farmer makes a more conscious decision on the degree of automation. There is a wider spectrum between low-tech and high-tech equipment. More than half of the piglet producers, a good third of the pig fatteners and a quarter of the dairy producers use electronics and IT. The lower percentage of dairy producers can be attributed to the still-common smaller herd sizes of about 20 cows. By contrast, two-thirds of the survey participants use PC and Internet applications in the office.

What stood out was that only a few farmers plan to use more electronics and IT in field work in the future. With stable and yard work, the percentage of users stands in single figures, and it is not significantly higher for PC and Internet applications in farm management.

Satisfaction

For the questions on satisfaction and effects there were four graded response categories, for example "low", "rather low", "rather high" and "high", as well as an additional "no comment". For a better overview, only those farms that answered the appropriate questions are listed in the figures. Questions

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Keywords

Electronics, information technology, utilization, satisfaction, benefits, requirements

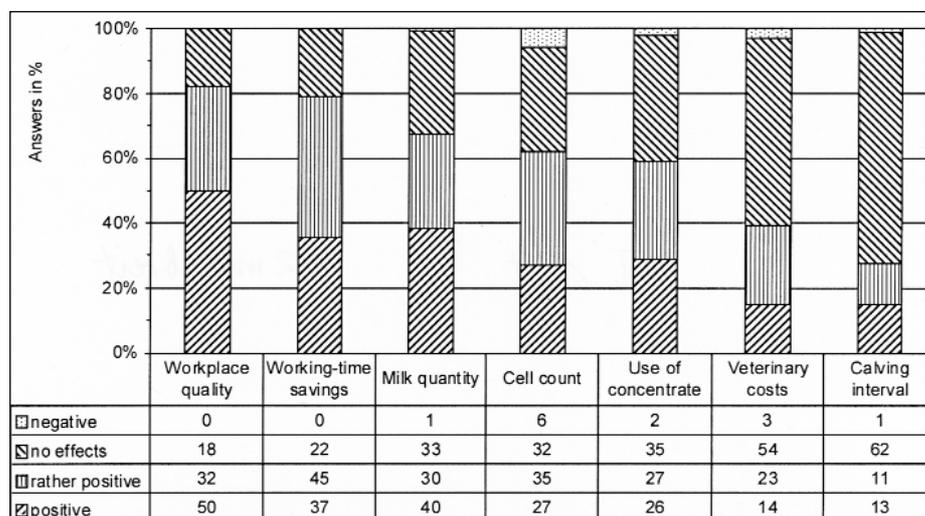


Fig. 1: Effects of electronics and IT in dairy farming

that were not filled in and the response category “no comment” were excluded. For greater ease of interpretation, the data table with the absolute figures is underneath the appropriate picture.

In general, survey participants’ satisfaction with electronics and IT in both field and stable and yard work is “rather high” to “high”. The values for the use of electronics with tractors illustrate this. Depending on the components, the ratings “low” and “rather low” were only given in 5 to 20% of cases. The picture looks even more positive for sowing and spreading technologies, as well as for harvest machines.

In dairy technology, the statements are more differentiated. With widely used technological components such as animal identification and milk-quantity measurement, satisfaction levels are high. With less widely used components such as e.g. temperature recording in the milking unit or conductivity measurement, satisfaction levels are lower and the range of variation of the responses higher. For feeding technology in dairy production such as feed mixers, concentrate feed stations and automatic drink dispensers for calves, ratings lie almost exclusively in the “high” to “rather high” range.

Owing to the great importance of dairy production in Switzerland, the effects of the use of electronics and IT in this sphere were recorded in a separate question. The changes in the spheres of working-time requirement and workplace quality on the one hand, and milk quantity, cell-count content and concentrate use on the other are rated as “positive” or “rather positive” in about 80% and 60% of cases, respectively. For veterinary costs and the interval between calving, the percentage of those unable to detect any change predominates (Fig. 1).

In piglet production and pig fattening, electronics and IT are mainly used for feeding and ventilation control. Here too, satisfaction levels are almost always “rather high” to “high”.

For farm management, PC software and Internet applications are used. For both standard applications such as e.g. word processing and spread sheets applications as well as specialised software such as agricultural field records and herd management, satisfaction is in the “high” to “rather high” range. The Internet is used intensively above all in the spheres of information procurement, online banking, and the breeding associations’ Internet portals. Over 80% of the cattle-rearing farms report animal data to the national Animal Movement Database via the Internet. Satisfaction with the applications lies in the “high” to “rather high” range.

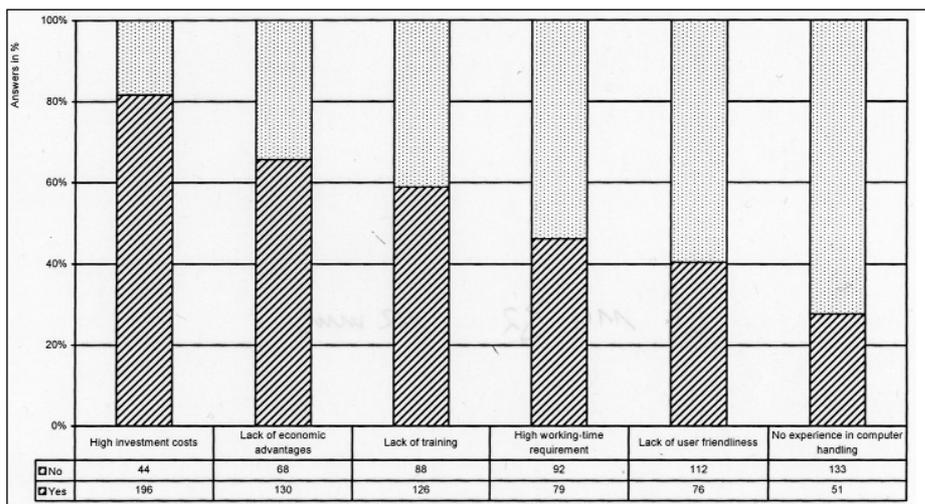


Fig. 2: Main reasons for not using electronics in agriculture

Fulfilment of expectations

Farmers’ expectations of technology have only been fulfilled in part. With “soft” goals such as workplace quality and working-time savings, user satisfaction with electronics and IT is “high” to “rather high”. With clearly measurable goals such as cost savings, lower expenditure on means of production and higher yields, however, the percentage of those whose expectations were met only to a “low” or “rather low” extent predominates at approx. 70%.

Potential for improvement and development

Responses to the question concerning improvement and development potential for applications in field work, stable and yard work and farm management focused on several key points. On the one hand, participants in the survey see a need to catch up, particularly as regards reliability and the operation and servicing of tractors. On the other hand, more training and easier applications are needed in the office-work and farm management spheres.

Impediments

The question as to the reasons for the low use of electronics on one’s farm was also answered by many non-users. High acquisition costs were cited as one of the main impediments to the use of electronics, followed by lack of economic advantages, lack of training/instruction, high time requirement, lack of user-friendliness and lack of understanding of the computer (Fig. 2).

Conclusions

In general, it can be said that farmers are to a large extent satisfied with the different components used.

Electronic and IT components do not always expand functions, and do not automatically lead to improved cost-effectiveness. As a rule, an increase in convenience for the user is immediately obvious.

Comparative calculations in dairy production [2, 3] showed that there are no appreciable changes in working-time requirement. A shift from physical to mental work is experienced subjectively as working-time savings.

The primary impediments of “high acquisition costs” and “no economic advantages” can be countered with a transparent presentation of the costs and benefits of electronics and IT, the lack of training with well targeted training concepts.

Literature

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