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The advantages must be convincing

Introduction of technical innovations for large farm modernisation

The farms that took over from the LPG structure have undergone a comprehensive transformation process since 1989 during which targeted innovations could offer creation of competitive infrastructures. A focal point was increasing labour productivity. Alongside the successful adoption of innovations there have also been new aspects that have found only limited acceptance. These can be divided into two categories: proven systems that do not, however, fit into large farms, or very innovative systems without, so far, convincing cost benefits.

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Innovation development over the last decade in the legal successors of LPGs in Brandenburg was investigated via ex-post analysis. Understood as „innovations" in this context were technical or organisational introduced on-farm before reaching proven reliable performance in practice. Preparing a questionnaire on this subject involved comprehensive interviews with farm management [1] and key personnel to identify the most important innovations in farm technology since reunification. A total 40 farms participated in the questionnaire. A comparison with data from the regional test farm network of the BMVEL showed that these farms were representative of Brandenburg farming companies, other than dairy farms, regarding area utilisation and stocking rates.

The experts' view: the most important technical innovations since 1990

To help define the questionnaire selected experts from various specialist areas were asked to identify practically-relevant innovations in farming since 1990, limiting themselves to those with significant influence on labour productivity and organisation *(table 1)*.

Those presented in table 1 are divided relatively evenly over cropping and livestock production and, with only a few exceptions, were able to be included in the questionnaire.

Results of questionnaire

The introduction dynamic of farm-specific innovations presents three different patterns. Some innovations were completely or almost completely introduced by farms. Hereby the typical S-curve form was apparent with a limited number of early acceptances of a particular innovation followed by the majority of farms and then the stragglers making the same moves relatively late-on *(fig. 1)*. A further proportion of innovations also found widespread acceptance amongst farms although the S-curve for this group was not so pronounced and achieved a lower final acceptance level. With the third group of innovations only a very hesitant, continuous introduction was apparent. Here, hardly any S-form was created and introduction rate remained under 20%.

Introduction of innovations in livestock production

Some innovations were almost comprehensively introduced, especially in livestock production. These included computer-supported herd management. The introduction dynamic here was very high right from the start. TMR was introduced into around 90% of farms up to 1999. The curve progress here showed that introduction could be complete at this level. The third very successful innovation in livestock production was the open housing featuring either new-build barns after reunification or else renovations. Around 60% of farms had introduced this type of building up to the time of the questionnaire. The introduction curve showed a steady growth within the investigated period so that it can be expected that still further farms will introduce this innovation.

Within the first decade after reunification only every tenth investigated farm had introduced big bale silage. The introduction curve was correspondingly flat and indicated little chance of particular increase in the coming years.

Table 1: Expert statements concerning essential innovations in agriculture since 1990

Crop production	Livestock production
• Precision farming (GPS)	• Automatic milking system (AMS)
• Genetically modified seed	• Total mixed ration (TMR)
• Mulch seeding • Direct drilling	• Process performance according to DIN 19222
• Pulled sprayers	• Computer supported housing ventilation
• Field recording (combining) • Tractors with stepless transmission	• Computer supported herd management
• Grain chaser trailer (combining)	• Computer supported feeding and manure management
• Swath combining (grain harvest)	• Open housing
•Bale loading wagon	• Big bale silage
• Electronic diagnosis	

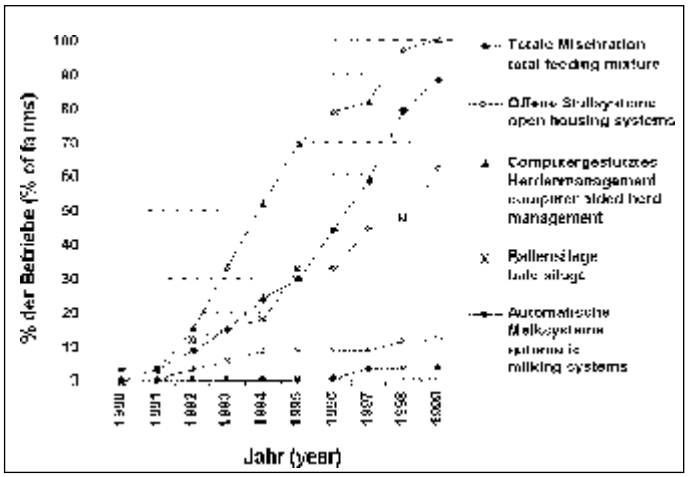

Fig. 1: Dynamic of adoption of selected innovations in animal production and feeding stuff conservation

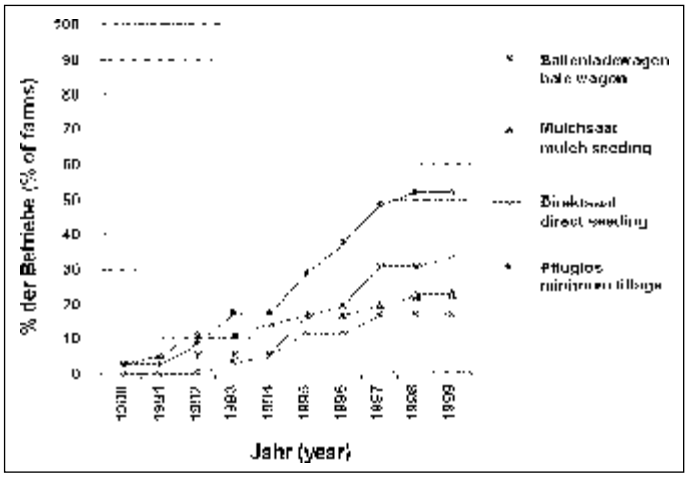

Fig. 2: Dynamic of adoption of selcted innovations in crop production

Introduction of cropping innovations

The plant production innovations can also be divided into differing areas. The first area concerns the different systems for non-inversion cultivation techniques. To this could be added direct drilling as the most consequent way of reducing field passes *(fig. 2)*. But compared with the successful innovations in livestock production it was clear that acceptance of new systems was not so widespread in cropping. The introduction dynamic of cultivation/drilling systems showed an almost completed and flat S-curve. Despite this, these innovations can be described as successful introductions. On the other hand, the following innovations have found very limited resonance up until now: chaser grain trailers, bale loading wagons and elements of spatially specific farm management.

On the acceptance of technical innovations

If one looks at the activities of farms in the context of technical innovation introductions, one can make the following deductions: basically the investigated farms showed a high degree of readiness to accept innovations, with actual potential for each possible introduction very precisely identified. Some innovations were not accepted by all farms, but only from a limited proportion of those surveyed. The ground for the limited acceptance of innovations should be looked into object-specifically. Firstly, in a rough exercise, two groups could be differentiated:

a) proven innovations which could offer a clear advantage for the structures and sizes of farm investigated, and
b) innovations with functions that are still not completely proven.

If one looks at the most successful technical innovations, these are aimed in the first place at contributing to labour productivity in livestock production as well as cropping. A second reason is the sinking of average costs an aim achieved, e.g., by introducing open housing.

Innovations such as big bale silage only interested a proportion of the farms investigated. For large farms, this sort of silage-making offers advantages only in individual cases and their introduction rate is accordingly low in this category of farm.

Systems with a very high innovation content such as Automatic Milking Systems (AMS) and the use of spatially-specific farming components should be discussed on their own. AMS up until now has mainly been offered as a single-box plant with a capacity of up to 55 cows. Newer systems feature three or four boxes and correspondingly larger milking capacities up to 220 cows. Herds this size correspond mainly to family farms whilst the herd size in the investigated staffed farms ran from 160 to 1010 milking cows with an average of 450 animals per farm.

Spatially-specific management can lead to savings in the application of inputs and to yield advantages in relationship to the heterogeneity of the locality [2]. These advantages have to be considered along with the investment and maintenance costs for the information management. It remains clear so far that under present production conditions the system leads to a convincing price: benefit relationship only in individual cases. The investment planning for surveyed farms indicated that there was interest in AMS and spatially-specific management. Up until now, apart from the „innovation pioneers“ which have already introduced the appropriate systems, a further 12% conveyed mid-term interest and a further 6% long-term interest in the introduction of AMS. Another 15% of farms indicated interest in introducing elements of spatially-specific management.

Literature

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