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The "Zeilitzheim" transborder farming project

Too-small land strips lead to over-proportional labour input, yield penalties on border areas, overlapping with associated overdosing in fertilising/spraying, high proportions of headlands with soil structure damage and, in total, high production costs. Traditional consolidation of such fragmented holdings often fail because of the costs involved and landowner fears of being disadvantaged in the associated land redistribution. Help here could come from virtual consolidation of land strips. This project highlights the attainable advantages and cost savings.

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Keywords

Transborder farming, virtual farm consolidation, management strategies

Appreciation

The Federal Ministry for Education and Research (BMBF) supported, as part of the cooperative project „preagro", the part-project „Micro-precision farming" featuring transborder farming with GPS in Zeilitzheim. Special thanks are due to the farmers involved for their willingness to take active part in this project and to the company manager of the MR Gerolzhofen e. V. for his great dedication in the coordination and support of the project.

Literature details are available from the publishers under LT 01314e or via Internet at http://www.landwirtschaftsverlag.com/landtech/local/fliteratur.htm

Individual field strip size in Bavaria currently averages around 1 ha. This varies very much between districts. In Lower Franconia the average farmer works 37 strips each an average 0.68 ha. The negative economic results include lengthy machinery downtime, too high transport times and a low proportion of total time spend actually working in the fields. The farming procedure is characterised by large areas being used for turning operations, border strip effects and overlapping. The resulting farming costs are comparatively high.

Fieldwork systematic as possible

Traditional land redistribution programmes are available for improving this situation. In village communities such projects often fail, however, through resistance from the, in the meantime, people who mainly only use their farms as additional income source or farm part-time, or those who have left agriculture altogether and rent the land out. These people fear disadvantages in redistribution and also see no financial advantage in it for them.

For these reasons, the remaining active full-time farmers often seek specific solutions such as consolidation through strategic renting, renting larger blocks further away from home, and/or consolidation through exchanging strips. However, in this they often have to accept many disadvantages and not seldom end up paying inflated rents in the process of rapidly attaining a realisable structural improvement.

Additional possibilities for structural improvement can be achieved through utilising information technology with farm machinery thus using transborder farming to create „virtual consolidation of fragmented holdings" according to a variety of management targets *(fig. 1)*.

This means there's no change in ownership. Depending on the willingness of the landowner (landlord), owner-oriented, collective or partly site-specific management targets can be realised and also altered rapidly.

Project „Zeilitzheim"

For investigating these, in the main, theoretical possibilities, the project „Micro-precision farming" was introduced into the cooperative project „preagro" (management systems for site-specific cropping for increasing the economic viability of agriculture and for encouraging its environmental performance; BMBF 0339740). Involved from the start were: local rural

Development authorities; agricultural administration; sugar industry, machine ring and five open-minded farmers. Possibilities and limits were addressed at a first on-site meeting for all concerned. There followed many individual discussions within the community until a first transborder farming unit could be created *(fig. 2)*. Parallel to this and during the first year management, two further transborder farming blocks were established for the following year.

Scientific backing recorded basic data, the procedural-technological translation of management aims and the first procedures for recording information from the site-specific management – with creation, installation and care of the required technology. Also accompanying this was basic work on the legal aspect of the procedure [3] and the comparison of practical and simulation results [4].

Table 1: Calculated additional cross margins of a 4 farms cooperative with exclusive transborder farming (100 ha, rotation with winter wheat, winter barley, sugar beet and maize for silage)

Parameter	Unit-	Winter-wheat	Winter-barley	Sugar-beet	Forage maize
Proportion of area in the rotation	ha	41.0	20.5	20.5	20.5
Additional yield	€/ha	65	33	54	
Reduced costs	€/ha	58	54	97	75
Additional gross margin (I)	€/ha	123	87	151	75
Reduced working time	€/ha	26	24	21	25
Additional gross margin (II)	€/ha	149	111	172	100
Additional gross margin (I) Total farmed land	€/ha				11460
Additional gross margin (II) Total farmed land	€/ha				13961

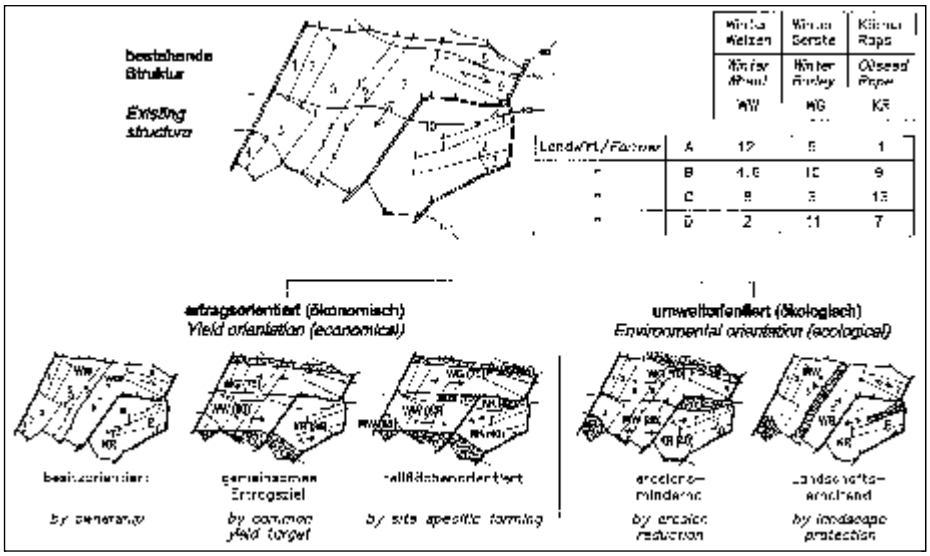

Fig. 1: Transborder farming systems [2]

Initially three transborder units

After 18 months operation a lot of experience and results are now available. From these, the following important points have emerged:

Unit creation
The greatest problem arose from consideration of the ownership relationship on the one hand, and on the other, the required rotations of the farms taking part.

Unit size
Simulations indicated that, with an accepted average working width of 3 m and an average working speed of 8 km/h it could be possible to achieve a performance improvement of around 80% on areas from 7 to 8 ha [5]. In reality, existing borders caused by roadways limited unit size to 7 ha.

Management
Here, emphasis was on utilising the „best available technology" from the machinery owner. The special knowledge of an involved farmer was able to be used for the cropping. Farms shared the harvesting using self-propelled machines with yield recording.

Input and yield calculations
The management of the first unit was according to the strategy „common yield target" through the same procedure for all strips. The inputs were manually recorded because automatic processor data recording was not available. Yield recording was through three parallel investigation methods: sample beet lifting with analysis by the sugar factory, integrated yield recording via weighing rollers on the conveyor webbing of the 6-row SK lifter/bunker harvester, and total harvest recording at delivery of the beet. The calculations were divided over the area with correction values administered for the preceding crop.

The initial sum

Based on the data from the first transborder unit, an economic evaluation was carried out. For this it was assumed that the farms involved managed their total area in the form of a „virtual land consolidation" according to the strategy of „common yield targets".
It was also assumed that:
- an average unit size of 7 ha had been achieved,
- rotations used comprised winter wheat/ winter barley/ forage maize/ sugar beet,
- no new machinery had to be bought,
- the best available technology was used, and
- no further-used machinery was considered in the costings.

Based on these assumptions, the extra returns and cost savings achieved are presented in *table 1*. It was also assumed that unit management in the form described required no further input costs and that there were also no further costs created by the shared harvesting.

From this, without consideration of labour savings, was achieved between 75 and 151 €/ha•a or 11460 €/a as total sum for the farms involved. Including the labour savings increased gross margin by a further 22% to almost 14000 €/a.

What comes next?

In the meantime the strategies for the now available three transborder farming units have been established with management policies for the coming years accordingly planned:
- unit I: common yield target with rotating work direction,
- unit II: part strip management with rotating work direction,
- unit III: owner-oriented management with retention of cultivation direction.

At the same time, the cropping methods on the, in the meantime, determined guidelines of the cooperative project were added and the successfully started automatic farm data recording was expanded to take-in the project.

To this was added a study of the total community with analyses recognising zones to be protected and other environmentally-relevant requirements in the creations of the transborder farming units, the C-value within the required rotations, and the possible establishment of a „ecologically planned unit".

First analyses and model calculations with real data from the project will conclude the investigation and present consolidated data for the evaluation of these new management forms.

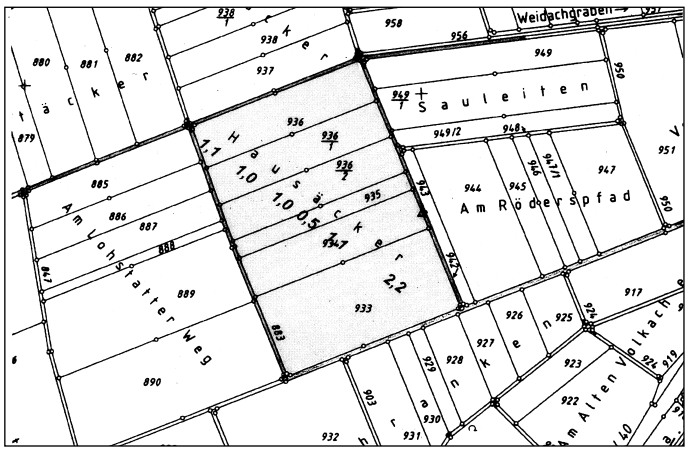

Fig. 2: Transborder farming field „Hausäcker"