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OPPORTUNITIES FOR THE DEVELOPMENT OF AGRICULTURAL FIRMS IN EAST GERMANY

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Abstract

On the basis of empiric data gathering and dynamic planning calculations, this investigation analyses the decisive planning hindrances for agricultural enterprises in the new states after the change to market economy.

With dynamic planning calculations for typical enterprises of different legal and business forms the optimum development of these enterprises for a ten year period is described and the influence of alternative location and support conditions analysed. Apart from the disadvantages in the area of the decision making structures, which can be described only insufficiently in an quantitative model, the results of the model calculations indicate, that the legal successors of the APCs (Agricultural Production Cooperatives) are thoroughly able to fulfill the requirements for a stable enterprise development. This can only be successful if through in time rationalisation and extension investments the future production guidelines are taken into account and the workforce of the enterprises can be adapted to the requirement.

This statements are also true for partnerships, that originated in an APC and are now operated under the management of a trust. Though the usually very low equity capitalisation and relatively high fixed cost burden of these enterprises restricts their development opportunities considerably. On the other hand, partnerships with financially strong western partners and an efficient management can be profitable even under less favourable frame conditions. In this case a stable enterprise development and operational growth can be achieved largely by oneself. Re- and newly established family farms have, contrary to larger enterprises with foreign labour, no problems in the area of working motivation. Under the condition, that the scale of the production can be adapted to the labour capacity of the family and the financing of necessary modernisation measures is guaranteed, the ordinary planning model for this group of enterprises indicates an ensured existential development.

1 Introduction

With the introduction of the market economy, a tremendous process of re-orientation commenced in the states of former East Germany. With regard to the initial positions and the developing opportunities of the agricultural enterprises in the future, a number of problems exist, which are independent from legal form of the enterprises. The conflicts that arise when joining land and building properties belong to this as well as the problems related to the privatisation of the Treuhand land (the Treuhandanstalt (THA) is a government controlled trust that administers the former state owned assets). On the other hand, a number of problems for example the claims for financial support, the procurement of foreign capital and the decision making within the enterprises vary from one to another legal structure. Development hindrances for agricultural enterprises can therefor not only be realized depending on an enterprises economic and natural location conditions, but are also determined by the choice of the legal structure. Additional development problems and adjustment necessities due to the EC's 1992 agricultural reforms will arise for all forms of enterprises.

The following investigation shall analyse the causes of the development hindrances that exist at present for the different legal structures (re-establishers, partnerships with and without western partners, legal successors of former agricultural production cooperatives (APCs)) on comparable locations. The restructuring of the agricultural sector in the new states is still going on. Most of the agricultural firms face a far reaching adjustment process which gives a multitude of possibilities for extension and modernising investments. The question if, and how typical farms of different legal structures can work economically efficient or even build new company capital will be discussed in dynamic planning calculations for a period of ten years. The basis therefor is formed by empiric data gathered on selected agricultural enterprises in the new states. To examine the meaningfulness of the individual results and to show regional relationships, supplementary surveys at agricultural administration authorities and private consulting firms were carried out.

2 Data basis

The data gatherings used in this investigation were carried out during the second half of 1992 on selected agricultural enterprises in East Germany. To obtain most accurate and

complete data, the gathering was carried out on site by using a questionnaire instead of mailing forms or carry out the gathering by telephone.

The main area of the investigations stretches over the state of Saxonia. 18 out of 23 examined agricultural enterprises are located in Saxonia, each two in Mecklenburg-Vorpommern, Sachsen-Anhalt and Brandenburg and one in Thüringen. Consequently, areas with different natural location conditions were included. Regarding the legal structure, the group of legal beings, predominantly in the form of APCs, represents the largest proportion with a number of 10 enterprises. Furthermore six partnerships, one limited partnership and four re-establishers were included.

Starting from the objective of this project, which investigates development hindrances for different forms of enterprises, a distribution of the agricultural enterprises into groups with similar characteristics was necessary for further examination and discussion of the results. The reasons have to be seen in differences in factor endowment, origin of capital and equity quota as well as in the problem of the "old debts" (debts that originate in GDR times). The land endowment differs considerably between re-establishers, partnerships and enterprises in the form of legal beings. Also differential is the average number of employees and animals per hectare of agricultural land on the farms of natural and legal beings. Regarding the capitalisation and the origin of the capital, differences can not only be stated between natural and legal beings but also within the group of partnerships. Civil law associations with western partners or capital participation from the old states have remarkably higher equity quotas than enterprises without western participation. The successors of the former APCs in the form of legal beings can also be divided into two groups. The enterprises of the first group can be characterised by a large workforce per area, a lot of old debts, a low equity quota and low profits. Contrary to this the enterprises of the second group have few or no old debts, a relatively small workforce per area and a higher equity quota. According to these criterions and parameters, the examined enterprises were distributed to the following groups.

The partnerships are divided in partnerships with western participation and partnerships without western participation. With respect to the operational developments to come, the enterprises in the form of legal beings are divided into two groups: the legal successors with a favourable initial position and the legal successors with an unfavourable initial position. The individual enterprises are represented by the group of re-establishers (Table 1).

Table 1: Groups of enterprises

	Re- establishers	Civil law associations		Legal successors	
		with western participation	without western participation	favourable initial position	unfavourable initial position
Farm area (ha)	234	1606	2473	1672	2997
There of grassland (%)	3,3	2,8	11,0	21,6	18,6
Labourers - plant production	-	7,6	18,7	23,4	33,0
Labourers per 100 ha		0,5	0,8	1,4	1,1
Labourers - animal production	-	6,9	42,7	21,0	59,8
Labourers per 100 LU		1,9	3,4	3,3	2,5
Total labourers ¹	2,0	17,5	66,4	51,4	101,8
Livestock (LU)	73,7	356,2	1249,0	634,0	2182,4

¹ including management and administration

3 Simulation of the Development of Agricultural Firms under Typical Production Conditions

3.1 Data Base and Structure of the Farm Models

In the initial year of the planning period the product and factor prices were set as they were in the year of 1992 for the region of the new states. For products which are included in the CAP reform the producer prices of the following years were adapted corresponding to the price resolution. With exception of the labour costs the other product and factor prices have not be changed throughout the planning period. A yearly increase of 5 % was assumed for the labour costs.

Because simulation planning for a single firm is not representative and of no general validity typical farm models were selected to show the development in general. The most typical characteristics and structures of the selected farm models are shown in Table 2.

Table 2: Structure of Model Farms in t_0

	Legal successors	Civil Law Associations		Re-establishers
		without western participation	with western participation	
Farm area, total (ha)	2200	1300	1300	275
crop area (ha)	1800	1200	1200	250
Livestock				
cows (Stück)	500	240	240	16
beef cattle (Plätze)	600	400	400	50
sows (Stück)	200	80	80	0
feeding pigs (Plätze)	1000	400	400	0
Hired labourers				
in plant production (AK)	18	9	5	-
in animal production (AK)	25	12	11	-
others (AK)	6	5	2	-
Family labourers (AK)	-		3	2
Milk quotas (kg)	2.500.000	1.200.000	1.200.000	360.000
Sugar beet quota (dt)	40.500	27.000	27.000	5.625
Cash equity (DM)	250.000	130.000	730.000	125.000

3.2 Methodological Proceeding and Model Specification

Planning and optimization of the whole farm development in a multiperiod model comprises the simultaneous solution of the following tasks:

- A) Determination of the optimal production programme with the optimal allocation of available production capacities in each period;
- B) Determination of the optimal investment programme with the selection between all the possible investment alternatives and the determination of the optimal point in time for the investment and the optimal order of investments;
- C) Determination of the optimal financing programme, ensuring liquidity of the firm.

Using a dynamic linear programming model it is possible to consider the numerous interdependencies between the described tasks and to show the concrete development of the firm as a whole. The simultaneous dynamic planning model consists therefore of a production, investment and financing model. The goal of the planning model for all farms is to maximize the company capital by the end of the planning period. Therefore, the costs and the private withdrawal are considered in each production period. The planning period consists of a total of ten one-year production periods (t_0 to t_9) where t_0 is the initial period in which the use of the available production capacities will be optimized but no investments in buildings are allowed.

Available investment activities are investments in machinery, new or rebuilt housing for cows, sows and hogs. Machinery investments enable the reduction of labour. New or rebuilt housing for cows also reduces the demand for labour. Furthermore, the use of modern feeding and milking equipment lead to a higher use of the yield potential of the animals. While the number of cows is restricted by the milk quota the investment of new buildings for sows and hogs enables to increase production. There are no restrictions of cattle fattening in this model due to building capacities.

Possibilities of outside financing are usually bank loans of different runtime (interest rate 9 %), firm loans with reduced interest rates for the purchase of big machinery and by state/federal support programmes with interest reduced loans and public loans. According to the guidelines of the state/federal programme the later loans are restricted to certain investments. For the legal successors the old debt regulation is integrated in the model.

Alternative scenarios consider that in a lot of legal successors the reduction of the labour proceeds in a suboptimal manner because of the member and leaser status of the labour. Additional alternative scenarios show the effects of administrative influence on the development of the agriculture in the new states. Therefore, a reduction in the support for loans and in the lease of state owned land by 20 % is simulated.

3.3 Simulation and Planning Results

3.3.1 Registered Cooperatives

Table 3 shows the optimal farm organization and structure for the registered cooperatives in the initial period (t_0) and in the last period (t_9) for different scenarios. The first solution which is used as a reference includes the possibility of an interest reduced loan (max. 3.15 mio. DM, interest rate 4 %). The number of workers is immediately adjusted in the first planning period (t_1). For the whole area of the farm (2 200 ha) there is a long term lease agreement and the old debts sum up to 750 000 DM. If a profit is gained in one of the planning periods, 20 % is used for payoff in the next planning period.

The reference solution shows a significant shift in the cropping structure (Table 3). Due to the reduction of the cattle stock forage production is reduced in favour of rape seed production. These EC programmes force the farm to set aside 250 ha arable land after 1993.

The labour intensive processes of milk production in the available buildings can no longer compete facing the increasing costs for labour. Under the favourable conditions of the reference solution a new building for 400 cows has been built already in t_1 . 50 % of the new building is financed by an interest reduced loan of 1.5 mio. DM. Beef production will be reduced continually due to the increasing labour costs and is only of marginal importance in t_9 . In the periods of t_2 to t_6 the obtained profits are used to extend hog production to the maximum level.

The firm is able to reduce its labour force until period t_2 immediately by 17 of the original 43 workers. The most important reason for this is the new building for milk production and a set aside of nearly 15 % of the arable land. Between period t_3 and t_9 the labour force is reduced by five more workers.

The original 750 000 DM old debts can be reduced in the considered 10 years by more than 75 %. The growth in the company capital shown in Table 3 covers the whole planning period and is the net worth in t_0 . This amount corresponds with a yearly growth of the owner's capital of 138 DM/ha and is significantly lower than the recommended value of 300 DM/ha. In relation to the size of the farm the increase of the company

capital by 140 DM/ha should be seen as a positive result. According to the number of workers a yearly increase of the company capital by 9 783 DM per worker is obtained.

The alternative simulation "without interest reduced loans" shows only marginal differences in the production structure compared with the reference solution (Table 3). Like in the other solution, the new building of the milk production facilities is accomplished in t_1 .

Therefore, the further investment in hog production is delayed to periods t_3 to t_7 and reduced to a smaller extent. Due to the much higher repayments liquidity of the firm is clearly restricted compared to the reference solution. As a result the growth of the firm is by 220 000 DM or 10 DM/ha and year smaller of the company capital.

The scenario with a restricted labour adjustment (Table 3) meets the ideas of a lot of managers or legal successors who expect further adjustments in the labour stock could only be realised in small steps. Here it is important to know that the remaining workers of a cooperative firm usually are landowners or at least members of the cooperative. Therefore, further dismissals would be of a disadvantage for the firm. Accordingly the reduction of workers is restricted in the model depending on the average age structure of the workers. As Table 3 shows the optimal solution under this restriction goes with an recognizably increased livestock production. Beef production will be increased and shows only little decrease in the following years. In milk production the restructuring of the buildings is preferred to the erection of new buildings. To use the total capacity of the workers hog production will be extended to 400 sows and 3 000 fattening hogs in planning periods t_1 and t_2 . The interest reduced loan is used to the maximum extent of 3.15 mio. DM. Due to the unsatisfying profits of the firm the old debt stock can only marginally be reduced. The total of interest payments accumulates to 140 000 DM in ten years. Compared to the reference solution significantly lower company capital is accumulated. In the balance of the company capital of 955 000 DM and a net present value of the originally old debts a capital stock of only 400 000 DM could be accumulated in the whole planning period.

The alternative planning scenario of withdrawal of land implies a reduction of the available arable land by 20 % in period t_1 . This value corresponds to the percentage of state owned land leased by the farms which have been analyzed. Both the production structure and the extent and timing of the investment actions differ hardly from the

reference solution. The adaption of the organization of the farm saves two workers. The growth of the company capital is reduced by 1.2 mio. DM. As a result, increase of the company capital by 97 DM/ha and year is acceptable. The net value of this increase declines to 6 048 DM per worker.

Table 3: Optimal Farm Organization of the Registered Cooperatives for different Planning Scenarios

Variant	Reference situation	with interest reduced loans	without interest reduced loans	with labour adjustment	Landwith-drawal 20%
Production period	t_0	t_9	t_9	t_9	t_9
Leased crop area (ha)	1800	1800	1800	1800	1440
Cereals, total (ha)	1260	1100	1100	1100	880
Rape (ha)	157	227	225	118	144
Sugar beet (ha)	90	90	90	90	72
Silage maize and forage (ha)	293	126	128	237	139
set aside land (ha)	0	257	257	255	205
Leased grassland (ha)	400	400	400	400	400
Livestock					
Cows	500	366	366	384	368
Beef cattle	538	40	50	478	99
Breeding sow	200	245	200	411	223
Feeding pigs	1000	1764	1440	2960	1605
Labourers					
in plant production	18	10	10	14	9
in animal production	25	11	11	19	10
Old debts (DM)	750.000	167.282	244.761	708.644	518.613
and total interest (DM)	0	0	0	141.750	0
Growth of company capital					
$t_0 - t_9$ (DM)		3.032.703	2.814.507	955.452	1.825.216
average:					
DM/ha land and year		138	128	44	97
DM/worker and year		9.783	9.079	2.171	6.084

The so far demonstrated planning scenarios are repeated with a significantly higher old debt burden of 2.5 mio. DM (1 136 DM/ha) for the firm. The extent of the investment activities decreases and the timing of the investment actions are delayed. Due to the higher

interest burden by the old debts the liquidity of the firm is restricted. Compared to the former situations with lower old debts the growth of the company capital will be reduced by nearly 1 mio. DM (45-50 DM/ha and year or 2 000-3 000 DM/worker and year). In none of the alternatives the profits are sufficient to reduce the old debt in the considered time horizon. Rather the profits are not enough to pay the interest. Only for the situation the interest reduced loans balance between growth of the owner's capital and net value of the old debts will be a positive value of 20 000 DM. Therefore, we can clearly conclude that firms with comparable high old debt burdens and no prospect for interest reduced loans and long term lease agreements for the state owned land face an uncertain development.

3.3.2 Civil Law Associations without Western Participation

The farm model of the Civil Law Association (east) is working under the roof of a property holding community. Partners in the property holding community are APC members. This organisation is responsible for old debts if there are any and the claims of APC members. The civil law association leases or purchases by long term lease-buings-models the necessary buildings, machinery and partly animals of the property holding community. The property holding community pays with this returns and revenues the old debts and claims. De facto the civil law association faces the same problems as the legal successors with the limitation that it has to serve the claims of the APC members and creditor claims only indirectly. But for that yearly fixed and considerable high amounts of money for lease and lease-hold of old buildings and old machinery is to pay to the property holding community. The legal form of the civil law association however gives the possibility to participate in the programme of re-establishing and modernising of family farms which allows for interest reduced loans and public loans to the extent of 1.2 mio. DM in total (interest rate 4 % and 1 %). The land size as well as the size of the livestock production and the labour force in the beginning of the planning period is significantly lower than in the legal successors (Table 2). The results of the planning calculations are shown in Table 4.

The reference solution is called full support and assumes that interest reduced loans and public loans are available up to the maximum extent. The number of workers can flexibly be adjusted according to the demand of the farm organization. For the whole

farm land there exist long term lease agreements. The change in the rotation from t_0 to t_9 is again determined by the reduction of livestock and the introduction of the set aside land. Both the new building of a housing system for dairy cows with 100 places and the extension of the fattening hog building by 180 places will be realised already in t_1 . These investments are based to two thirds on public loans (1.2 mio. DM). Interest reduced loans with an interest rate of 4 % will not be needed. The workers in production can be reduced by five workers in the planning period t_2 and by two more workers until t_9 . The growth of the company capital by 803 000 DM in net value gives a significant interest for the capital brought into the farm. With an average growth of the company capital of 62 DM/ha and year and 4 227 DM per worker and year the performance is at a medium level.

The results of the alternative scenarios reduced support and no public support consider the situation if no public loans or no public loans and no interest reduced loans are available. Both solutions are identical with respect to the production structure and the investments of the firm. Compared to the reference solution they only lack the extension of the hog production. This shows that the extension of the hog production has an internal interest rate which is lower than 4 % and is only profitable with the support of public loans. Otherwise the mentioned support instruments have no significant influence on the development of the firm. Only the growth of the company capital is reduced by the lack of interest subsidise by 217 000 DM or 326 000 DM.

More significant effects can be recognized, if 20 % of the arable land is withdrawn in planning period t_1 . Compared to the reference solution the investments in buildings and the extension of livestock is unchanged. In the crop production one additional worker can be saved. Nevertheless, the growth of the company capital declines by the decrease of revenue from plant production by 85 000 DM. The growth of the company capital per ha and year is only 1 DM then. The land withdrawal by this extent the durable existence and development of the farm.

Compared to the legal successor shown before, the Civil Law Association (east) remained behind. Main reason for this is the significantly lower milk quota and the relatively high fixed overheads for this firm due to the payments for the property holding community.

Table 4: Optimal Farm Organization of the Civil Law Association without Western participation for Different Planning Scenarios

Variant	Reference situation	full public support	reduced public support	no support	landwith- drawal 20%
Production period	t_0	t_1	t_2	t_3	t_4
Leased crop area (ha)	1200	1200	1200	1200	960
Cereals, total (ha)	723	733	733	733	587
Rape (ha)	240	159	159	159	111
Sugar beets (ha)	60	60	60	60	48
Silage maize and forage (ha)	177	77	77	77	77
Set aside land (ha)	0	171	171	171	137
Leased grassland (ha)	100	81	81	81	81
Livestock					
Cows	240	176	176	176	176
Beef cattle	289	99	99	99	99
Breeding sows	80	80	80	80	80
Feeding pigs	400	576	400	400	576
Labourers					
in plant production	9	7	7	7	6
in animal production	12	5	5	5	5
Growth of company capital $t_0 - t_4$ (DM)		803.173	585.796	477.150	85.268
average:					
DM/ha land and year		62	45	37	8
DM/worker and year		4.227	3.083	2.511	474

3.3.3 Civil Law Associations with Western Participation

In the initial period t_0 the farm model of the civil law association with western participation has the same crop and animal production capacities as the civil law association without western participation (Table 2). For the civil law association with western participation we assume that the number of workers already reduced in t_0 and orientated on the farm optimum and exclusively western equipment is used. Furthermore, the capital stock of cash higher by 600 000 DM in the initial situation as in the Civil Law Association (east). The financial support and the corresponding maximum limits come from the programme of re-establishing and modernizing of family farms. As an additional planning alternative in this model the possibility of lease of 600 ha of arable land is included. The assumptions for the other planning scenarios are corresponding to the

simulations for the civil law association without western participation. In figure 5.4 the results of the different planning scenarios are shown.

Already in planning period t_0 it is visible that a small labour force is sufficient due to the exclusive use of western techniques. In the reference solution with full public support the originally 16 production workers are reduced to 9 workers in t_9 . This is done essential in two steps (t_2 and t_5) and is based on the effect of the set aside of land, the new built milk production facilities in t_1 and in the gradually reduction of the cattle and beef production. The hog production will be extended by 40 % in planning period t_1 through the new building of hog fattening places. To finance the investment in buildings a public loan of the amount of 1.2 mio. DM is used. In the planning period of ten years the firm obtains a growth of the owner's capital of 1.63 mio. DM. Referred to the land in use and the labour stock value of 128 DM/ha and year and 10 158 DM per worker and year is reached (Table 5).

The results of the alternative solutions for reduced public support and no support are nearly identical in the case of the civil law association with western participation and show no difference to the reference solution in regard to the farm structure and organization. The availability of interest reduced and public loans has no influence on the optimal extent of the investments nor their timing. Also the liquidity of the firm is secured for all scenarios. Interest reduced loans with an interest rate of 4 % would only be attractive, if alternatives of farm investments with a higher interest are available. Alternative financial investments with higher interest are not included in the planning model.

In contrast to the legal successors the firms with western participation are less confronted with the questions of avoiding a land loss than to extend the so long used land. In the planning alternative additional lease of land is assumed that the firm can lease additional 600 ha arable land for the price of 6 DM per soil point. Even at this for the conditions in the new states high lease prices per farm can significantly increase the economic result in contrast to the extension of the life production. The growth of the company capital is increased compared to the reference solution by more than 40 000 DM. Due to the higher lease price of land the growth of the company capital is reduced to an average of 108 DM/ha and year. On the other hand the corresponding value is increased to 10 757 DM per worker.

Also for the alternative scenario of a land withdrawal there is only little change in the optimal farm organization. In the crop production an additional worker can be saved. The investments in the livestock production are carried out without a change. The growth of the company capital reduced in fact by 45 %. Applied to 1 ha of land it still remains an averaged growth of the owner's capital of 85 DM per year.

Table 5: Optimal Farm Organization of the Civil Law Association with Western Participation for Different Planning Scenarios

Variant	Reference situation	full public support	reduced public support	no support	additional lease of 600 ha crop area	landwith-drawal 20%
Production period	t_0	t_1	t_2	t_3	t_4	t_5
Leased crop area (ha)	1200	1200	1200	1200	1800	960
Cereals, total (ha)	762	733	733	733	1102	587
Rape (ha)	198	157	157	157	276	114
Sugar beets (ha)	60	60	60	60	90	48
Silage maize and forage (ha)	180	80	80	80	76	74
Set aside land (ha)	0	170	170	170	256	137
Leased grassland (ha)	100	75	75	75	81	80
Livestock						
Cows	240	176	176	176	176	176
Beef cattle	200	91	91	91	91	84
Breeding sows	80	80	80	80	80	80
Feeding pigs	400	576	576	575	576	576
Labourers						
in plant production	5	4	4	4	7	3
in animal production	11	5	5	5	5	5
Growth of company capital						
$t_0 - t_5$ (DM)		1.625.372	1.435.190	1.435.189	2.047.373	881.670
average:						
DM/ha land and year		128	113	113	108	85
DM/worker and year		10.158	8.970	8.970	10.775	5.877

3.3.4 Single Firms

The in the firm model for a single operation assumed land endowment of 275 ha (25 ha own land) is still above the average of the fultime farm in the new states, but it corresponds under the given structural conditions to the labour capacity of one family with

2 to 2.5 full workers. Furthermore the farm has own buildings to keep in the maximum 30 cows and 50 cattle. Places for the hog production are not available in the initial situation. As alternatives for investment decisions new buildings in the milk production (60 places) and in the hog production are possible. In addition the farm has the possibility to take over an existing milk operation (stanchion barn 100 places) and to remodel to a loose housing stable. As support the firm can use public loans and interest reduced credits up to a maximum of 400 000 DM.

In the initial period t_0 milk production is done to a small extent. The labour capacity of the family is used up due to the labour intensive production processes. Under the assumptions of a reference solution with full public support (40 000 DM interest reduced credit) 40 000 DM public loans) a new milk production building is built in t_1 so that full advantage could be taken of the milk quota in t_2 . The new building is mostly financed by the public loan in an amount of 40 000 DM. Investments in the hog production do not show up in the optimal solution. The average growth of the owner's capital reaches an amount of 46 000 DM per farm and year. Compared to the West-German family farms this is a result above average and corresponds to an average growth of owner's capital 169 DM/ha and year (Table 6).

Is the financial support of the farm reduced to the interest reduced credits (interest rate 4 %) (reduced support) then the farm organization and the investments of the firm are not changed. The new building of the milk production facilities will be financed by interest reduced credits instead of a public loan. The growth of the owner's capital of the firm is reduced by 72 000 DM and by 26 DM/ha and year.

If the farm has no possibility of public support, the new building of a stable will be omitted and the reconstruction of the Anbindestall is profitable in t_1 . Remarkable is, however, that the growth of the owner's capital of the firm is only marginally reduced.

The withdrawal of 20 % of the leased arable area reduces the stability of the single firm only to a small extent. By the extension of the beef production the labour capacity of the family can be used up after the land withdrawal in t_1 . The average growth of the company capital decreases to 134 DM/ha and year and to 30 500 DM per firm and year.

Table 6: Optimal Farm Organisation of the Re-establisher for Different Planning Scenarios

Variant	Reference situation	full public support	reduced public support	no support	landwith-drawal 20%
Production period	t_0	t_1	t_2	t_3	t_4
Leased crop area (ha)	250	250	250	250	205
Cereals, total (ha)	175	153	153	153	126
Rape (ha)	36	22	22	23	12
Sugar beets (ha)	13	13	13	13	10
Silage maize and forage (ha)	26	27	27	26	30
Set aside land (ha)	0	35	35	35	27
Grassland (ha)	25	23	23	23	23
Livestock					
Cows	16	55	55	55	54
Beef cattle	50	39	39	29	44
Breeding sows	0	0	0	0	0
Feeding pigs	0	0	0	0	0
Growth of company capital $t_0 - t_1$ (DM)		461.709	389.901	385.876	305.515
average:					
DM/ha land and year		169	143	141	134
DM/worker and year		23.085	19.495	19.294	15.276