Analysing Dairy Farming Development Strategies in De Achterhoek in 2017

Summary report

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1. Introduction

Dairy farmers in the Netherlands are facing a variety of challenges, e.g. meeting new legal requirements on phosphate emissions, dealing with periods of low milk prices, the consequences of climate change and not to forget how to manage your time doing all this on top of keeping your dairy herd in top condition. Many are there to help you, all kind of advisors will give their opinion on what to do best. It is obvious that for good strategy evaluation farmers require external input of specialists, but how to balance this with your personal goals?

In the second year of their dairy farming Bachelor program a group of five students executed an applied research in which they investigated alternative development options for two different regular dairy farm types in the east part of the Dutch province of Gelderland, also known as 'De Achterhoek'. The objective of the study was to clarify how the vision of the farmer, the present farm setup and expected external development are influencing the choice for the best strategy. It is also dealing with the question how to estimate the potential benefits of plausible alternatives from sustainability perspective. The challenge is not only to clarify the farmer perspective but also the stakeholder perspective.

The research was an educational project of the Dutch Dairy farming course of Van Hall Larenstein University of Applied Sciences (VHL) in Velp, supported by the professorship Competitive Dairy Farming of VHL and Wageningen Economic Research (WEcR), part of Wageningen UR. The research is participatory in nature: understanding principles of strategic management as well as doing research is executed by students, as a consequence students are in the lead to identify stakeholders, collecting information and doing the primary analysis.

The main question of this applied research is: What is the impact of the present and plausible alternative strategies on farming outcomes based on historic results and stakeholder opinions, considering an intensive and extensive dairy farm type in East Gelderland.

The following sub questions were formulated leading from a broader scope to a clear focus on expected consequences of specific development options:

1. What are the dairy farm types present in East Gelderland right now?
2. What is the main future external business environment changes that could influence the farm development strategy?
3. When selected two farms, an extensive and intensive farm, what are the farming goal, how is each farm organised?
4. What are the present 'People - Planet - Profit' (PPP) farming results of the extensive and intensive farm?
5. What are for the selected farms possible alternative farming strategies?
6. What are expected benefits of the different farming strategies, based on historic farming results?
7. What are the expected benefits of the different farming strategies, based on stakeholders' opinions?

The research was executed from September 2017 to November 2017. Two farms were selected to evaluate their development plans: they will be called 'Farm A', the extensive farm and 'Farm B', the intensive farm. The farms were selected because of the role they want to play in knowledge

dissemination and professional education. Both would like to see themselves as a farm representing a larger group of farms.

As stakeholders were selected:
- Processor: Friesland Campina Dairy Cooperative; district board member
- Bank: ABN AMRO; agricultural advisor
- Feed company: Forfarmers; farm development support advisor
- Farmer organisation: LTO, district board member
- Government sector: One Economic and Legal Advisor and one Land Use Advisor

The activities done in this professional education research project are:
- Development of a proper methodology and approach to reach the objectives of this project
- Literature research on sector structure and sector development
- Interviewing the farmers
- Designing suitable development plans
- Financial data analysis farms and analysis of consequences of proposed plans
- Effect on 'People – Planet – Profit' indicators that are relevant from farm perspective
- Interviewing stakeholders, confronting them with the farmers' plans
- Outlining Opportunities and Treats per plan per farmer, based on stakeholders' opinions
- Drawing conclusion on most suitable plan to be implemented
- Evaluating the added value of this research

The results were evaluated especially from learning perspective. Strategic management at farm level requires research skills, as well as understanding what practical and theoretical knowledge is required for proper evaluation of results and external forces. This knowledge and skills are acquired by the students, for the farmers there is an expected benefit of participating because of better insight in consequences of strategies. The researchers involved can improve the methodology for offering this type research in a professional Bachelor program.

The results of the research are summarized in this report. The full students report is written in Dutch language and is containing private information of farmers and stakeholders involved. Specific additional background information can be retrieved via the author of this summary, Ben Rankenberg; e-mail: ben.rankenberg@hvhl.nl.

2. Dairy farming in De Achterhoek

2.1 Regional development in dairy farming

De Achterhoek is an area in the East of the Netherlands, with dominantly sandy soils comparable with other areas in the Eastern and North sandy soil region of the Netherlands. De Achterhoek consists of 8 municipalities: Aalten, Winterswijk, Doetinchem, Oude IJsselstreek, Berkelland, Bronckhorst, Oost-Gelre and Montferland. On local level there is a big variation in soil types and different landscapes. The economic development is a bit less than in the rest of the Netherlands, farming is relatively important. Dairy farms are dominant, the size of the farm is comparable with the rest of the Netherlands. However, as can be seen in table 1 the share of dairy farms having less than 100 cows is bigger than in the rest of the Netherlands. The total land use by dairy farms is approximately 60.000 ha grassland and 12.000 ha used for fodder crop production.

Table 1. Number of dairy cows and dairy farms in the Netherlands and in De Achterhoek, distributed over different farm sizes as per category 'cows per herd'. (CBS, 2017)

Cows per herd	Cows Netherlands	%	Cows Achterhoek	%
1 tot 100	489.533	18,3	27.116	21,6
100 tot 200	1.312.614	49,0	67.789	54,5
200 and more	876.066	32,7	30.003	23,9
Total	2.678.213		125.536	
Cows per herd	Farms Netherlands	%	Farms Achterhoek	%
1 to 100	9.458	43,4	639	47,0
100 to 200	9.286	42,6	582	42,8
200 and more	3.117	14,3	139	10,2
Total	21.816		1.360	

2.2 Farm types in De Achterhoek

In the Dutch dairy farming sector the farming intensity is an important issue. The farms are often divided in intensive farming and extensive farming based on the capability to feed their animals with own roughage feed (grass products and fodder maize) or not. Another possibility for dividing in intensive or extensive is if they can place all manure at their own land, based on present legal requirements.

Another striking difference in dairy farms in De Achterhoek is if they raise their own youngstock or not. Numbers of farms that do not raise their youngstock are not available. Because of manure legislation the number of youngstock has decreased from 8,4 per 10 cows in 2000 to 6,8 per 10 cows in 2017. It is expected that this average number will go down further (CBS, 2017).

In the whole Eastern and Central sandy soil region 66% was grazing in 2015, from which 10% whole day during the summer period. This not much different from the rest of the Netherlands: 65% grazing, from which 20% day and night.

In Dutch dairy farming more and more processes are automated: milking robots, manure robots, feed robots, heath detection systems and bedding supply systems. The bigger the farm, the more options the farm has for choosing the right balance between labour provision and automations.

Organic farming is developing fast in the Netherlands, between 2011 and 2016 20.000 more dairy cows produce organic milk. Because organic milk is mainly produced for the fresh market the balance between demand and supply is always fragile.

In De Achterhoek there are in total 5.430 farms registered from which 1.633 have income of other activities than only agriculture. Those are mostly conservation of nature and landscape, tourism, contract work on labour and machinery. Farm shop sales and renting out farm buildings for goods and animals are regularly found. Most of the time these side income sources are relatively small, 64% of the cases earn less than 10% of their income from side activities. Where only 8% earns more than 50% of their income from side activities (CBS, 217).

2.3 Expectations on dairy sector development in De Achterhoek

The number of dairy farms in De Achterhoek will decrease, however the number of cows is expected to remain constant from this moment onwards because farms will grow in size. Farms having a surplus of manure related to the amount of hectares will be confronted with higher costs. Environmental protection issues have led to multiple policy measurements by the Dutch government and local authorities. In November 2017 the biggest risk for the Dutch dairy sector is ending the special position (derogation) in the EU Nitrate Directive. Combined with the traditional pressure on the farm land market from urban development and nature protection claims, land prices play an important role in the development of production volumes of the farms. As per 1-1-2018 new phosphate emission reduction legislation was implemented in the Netherlands, final details of that legislation were not known when this research was executed.

It is expected that in De Achterhoek a fair share of the farms will end up having a size between 100 and 200 cows. Those farms will try to reduce the land costs by intensifying as much as possible and finding technical solutions within the framework of the legislations. One of the solutions is to reduce the number of youngstock at the farm.

As farms grow in size automation will become a better cost effective solution than having more workers per farm. It is expected that grazing will remain popular, as long as the costs of grazing are covered by extra revenues in the market.

It is not expected that all farms will grow, because marginal costs for growing will be higher due to new legislation. Those farms that will not grow will try to increase the farm profitability by valorisation, meaning the farm setup has to be diverted towards specific niche market demands. Alternative activities outside of dairy farming might also be a popular but temporary solution.

2.4 PPP indicators for strategic development

Researchers of Wageningen Economic Research (WEcR) made a list of 67 indicators available from their farm result data analysis in the Netherlands (see annex 1). From this list a choice was made of 11 indicators of relevance for this research.

The selection of the indicators in this research was based on their importance for the competitiveness of the dairy farms. Basic ingredients of competitiveness are profitability, social and financial resilience. This could be translated in having a *license to operate* – meaning complying legal terms, having a *license to produce* – meaning complying with expectations of social environment and having a *license to sell* – meaning being respected by your customers. The selected indicators are listed below, including a specific motivation per indicator.

People:

Education → licence to operate
For dairy farmers it is important to be in communication with all kind of non-agricultural people to maintain social support and understanding of the concept of agriculture and animal husbandry. Giving access to your farm yard for educational purposes is one type of creating this societal communication.

Replacement rate → licence to produce and license to operate
Having a low replacement rate can be reached by increasing the life span of the dairy cow. It also means lower the farmer requires less youngstock, that will result in lower costs and lower environmental emissions per kg milk. In perspective of legal restrictions it means also possibility to have more productive dairy cows and higher farm milk production.

Grazing → license to operate and license to sell
Consumers are willing to pay a higher price for the milk in the supermarket for milk that is branded as 'Weidemelk'. This brand indicates that the milk is certified from cows that are grazing at least 8 hours per day during summer season. Grazing is not only important from commercial perspective, it contributes to a high extend to the image of the Dutch dairy sector that influences social acceptance of animal husbandry in the Netherlands.

MDV -stable (= Maatlat Duurzame Veehouderij = Measuring tool sustainable animal husbandry) → licence to operate and license to produce
This tool is designed to assess how new farm buildings are contributing to sustainability indicators on environmental impact, animal health and animal welfare. New buildings that comply with the standards got a certificate being an MDV stable.

Planet:

Manure surplus → license to operate
In the Netherlands there is a manure surplus on national level. At many farms there is a manure surplus at farm level, based on legal standards for the sake of environmental protection. The surplus at farm level has to be disposed by transport to another farm or by processing. The costs of transport and processing might be very high in dairy farming.

Kg phosphate per 1000 kg milk → license to produce
Because of the national manure surplus farmers have a phosphate quota per 1-1-2018. In case of increase in milk production the farmer has to buy phosphate production rights. The amount of phosphate per 100 kg milk depends on the number of youngstock and the milk production per cow, in the future also other factors might be involved.

Kg CO^2 per 1000 kg milk → license to produce and license operate
Because of global warming and further prevention of climate mitigation this indicator is important.

Kg methane per 100 kg milk → license to produce and license operate
Methane has a 25 times stronger impact on global warming than CO^2. In the future this indicator might be of specific interest for the dairy sector.

Profit:

Result in € → license to sell
Investments in technology for sustainable farm development will be much easier is a farm has profit. Nowadays financial evaluation of investments are done on cash flow basis in the Netherlands, because risk management is easier to assess.

Feed costs per 100 kg milk → license to sell
Feed costs take the highest part of all costs in most animal husbandry farms. Improving feed efficiency will lead to lower feed costs as well as lower environmental impact.

Cost price per 100 kg milk → license to sell
To compare farms in international dairy chains the cost price of the milk is an important indicator for competitiveness and for maintaining access to consumer markets.

3. Farming strategies two different types of dairy farms

In this research two farms were selected to evaluate their development plans: Farm A and Farm B, both located in East Gelderland. The main difference between the two farms is their idea how they should use their available resources. At farm A the production focus is efficient soil use, supported by latest research knowledge and newest technology, where at farm B the focus is on yields and results obtained in the stable, with the help of modern technical innovations. From land use perspective we can call farm A an extensive farm and farm B an intensive dairy farm. Both farms are described in this chapter at strategic level, what farm setup and goal they have with their farm, as well as what strategies could possibly fit with these goals.

3.1 Farm descriptions

Farm A

The main goal of farmer A is to have balanced production system, meaning labour, feed supply and manure supply on the land have to be balanced, and to be self-sufficient. The farm wants to intensify land use, thus increase profit through increased productivity of the land (kg milk per ha) from 13.584 up to 18.000. Farmer A offers facilities for farm tours and informative meeting for farmers and stakeholders.

In the present stable the farm has two milking robots, manure scrapers and a digital heat detection system. The farm has at the moment 89 dairy cows, 58 heads of youngstock at 55 hectares light sandy soils. An increase in number of animals should not lead to a higher labour requirement, so in that case automation has to be expanded.

Farm B

Farm B is organising farm based informative meetings especially for non-agricultural people and school children. The farm is representing a capital intensive dairy farming system. This system is getting a lot of negative attention nowadays, for that reason the farmer wants to bring a positive message improving the image of the farm system, emphasis on animal welfare and sustainability indicators.

The farm has built a new stable in 2015 for 280 dairy cows. The main farming goal is to generate income. At the moment they have 189 dairy cows (November 2017). In order to increase the number of cows or the production per cow the farmer has to acquire production rights, especially phosphate production rights. On top of this further innovation and optimisation according to new scientific insights and available technology will be implemented. At the moment the following processes are automated: milking robots, manure robots, automated supply of new bedding materials in the cubicles, in heat detection system, feed-pushing robot, drinkers for the calves, light management, wind screens, air vents.

The main reason for the investment in technology is reduction of labour requirements. Another important reason is data collection for monitoring of animal production and animal health.

In 2016 the replacement rate for dairy cows was 37%. Grazing is applied, but only partly.

The new stable is meeting MDV requirements, the CO^2-emission is 1224 kg per 1000 kg milk. The phosphate excretion of this farm is 9441 kg. The farm has 4 hectare nature land, from which hay is yielded, after which youngstock is grazing the fields.

3.2 Options for new strategies

Based on developments in markets and governmental policies the following farm specific development options are proposed.

Farm A

Strategy 1: optimising the present situation → Having less youngstock (more legal phosphate production space for productive dairy cows), decrease inter calving interval, reduce claw problems and to inseminate with Belgium blue meat type breed.

Strategy 2: increase milk production to 18.000 kg milk/ha without buying or renting extra land → Having to build a new stable (2A) or to expand the old building (2B).

Strategy 3: having another breed (Jerseys) → Having higher milk yield, feeding less concentrates, lower direct animal costs.

Farm B

Strategy 1: optimising present situation → Having 189 cows, reduce the amount of youngstock, higher land yields, reduce inter-calving interval.

Strategy 2: growing without extra land → Having 250 cows, ship out manure, buy feed, buy phosphate production rights.

Strategy 3: growing and buying (3A) or renting (3B) land → Having 250 cows, buy or rent 47 hectare land, buy phosphate production rights. No shipping out of manure and no buying of extra roughages.

Strategy 1 actually is not a new strategy but is for both farms continuation of the present strategy, so without further in-depth investment in the farm.

3.3 Evaluation of strategies

In this paragraph the three chosen strategies are evaluated on People, Planet and Profit outcomes. In the financial evaluation the results are presented on cash basis. This is because this is the nowadays common practice of financiers when evaluating farm investment. In this cash based calculation a simplified repayment scheme for repaying loans is used, using linear repayment over 30 years for land and phosphate rights and 20 years for the stable. In this way the cash based calculation can easily be translated to the consequences for the profit. In table 2 the financial results of farm A are presented, in table 3 financial the results for farm B. In table 4 the estimated results of the 11 PPP indicators, as discussed in chapter 2 for each strategy is presented.

Table 2. Cash flow based results farm A. Present situation (16/17) and expected results of the four scenarios: 1 Optimisation, 2A new stable, 2B enlargement of present stable, 3 Jersey instead of HF cows.

	16/17	Optimisation	New stable	Enlargement	Jerseys
kg milk	733.655	774.995	992.160	992.160	639.030
milk price 100 kg	€ 35	€ 35	€ 35	€ 35	€ 42
milk revenues	€ 256.926	€ 271.403	€ 347.454	€ 347.454	€ 268.393
sales cattle	€ 18.731	€ 9.810	€ 9.820	€ 9.820	€ 8.803
subsidies	€ 41.064	€ 41.064	€ 41.064	€ 41.064	€ 41.064
total revenues	€ 316.721	€ 322.277	€ 398.338	€ 398.338	€ 318.260
concentrate feed	€ 59.980	€ 63.349	€ 80.871	€ 80.871	€ 54.305
roughages	-€ 4.401	-€ 4.401	€ 6.614	€ 6.614	
animal costs	€ 32.188	€ 32.685	€ 43.400	€ 43.400	€ 30.618
landuse materials costs	€ 15.022	€ 15.022	€ 15.022	€ 15.022	€ 15.022
contactors	€ 42.918	€ 42.918	€ 42.918	€ 42.918	€ 42.918
shipping out manure			€ 15.560	€ 15.560	
gas/water/electricity	€ 14.400	€ 14.400	€ 19.415	€ 19.415	€ 14.400
maintenance building	€ 4.032	€ 4.032	€ 15.600	€ 7.932	€ 4.032
additional machinery costs	€ 34.814	€ 34.814	€ 40.000	€ 40.000	€ 34.814
other costs	€ 24.303	€ 24.303	€ 32.768	€ 32.768	€ 24.303
phosphate rights					
staffing costs	€ 2.980	€ 2.980	€ 4.000	€ 4.000	€ 2.980
lease/rent					
interest	€ 14.115	€ 14.115	€ 37.717	€ 24.506	€ 14.115
loan repayment	€ 25.000	€ 25.000	€ 59.838	€ 40.338	€ 25.000
private spending	€ 63.762	€ 63.762	€ 63.762	€ 63.762	€ 63.762
investments	€ 14.778	€ 14.778	€ 14.778	€ 14.778	€ 16.778
total spending	€ 343.891	€ 347.757	€ 492.263	€ 451.884	€ 343.047
net cash flow	-€ 27.170	-€ 25.479	-€ 93.925	-€ 53.546	-€ 24.787

Table 3. Cash flow based results farm B. Present situation (16/17) and expected results of the four scenarios: 1 Optimisation, 2 more cows without extra land, 3A more cows, buying land, 3B More cows and lease land.

	16/17	optimisation	more cows	buy land	lease land
kg milk	1.948.491	1.948.491	2.577.369	2.577.369	2.577.369
milk price 100 kg	€ 36	€ 36	€ 36	€ 36	€ 36
milk revenues	€ 693.663	€ 693.663	€ 917.543	€ 917.543	€ 917.543
sales cattle	€ 15.742	€ 10.642	€ 20.900	€ 20.900	€ 20.900
subsidies	€ 25.650	€ 25.650	€ 25.650	€ 25.650	€ 25.650
other activities	€ 10.000	€ 10.000	€ 10.000	€ 10.000	€ 10.000
total revenues	€ 745.055	€ 739.955	€ 974.093	€ 974.093	€ 974.093
concentrate feed	€ 134.446	€ 134.446	€ 177.865	€ 177.865	€ 177.865
roughages	€ 40.425	€ 27.858	€ 106.082	€ 40.425	€ 40.425
animal costs	€ 56.311	€ 54.043	€ 74.485	€ 74.485	€ 74.485
landuse materials costs	€ 27.084	€ 27.084	€ 27.084	€ 42.093	€ 42.093
contactors	€ 26.500	€ 26.500	€ 26.500	€ 30.750	€ 30.750
shipping out manure	€ 24.740	€ 10.660	€ 63.429		
gas/water/electricity	€ 16.562	€ 16.562	€ 21.907	€ 21.907	€ 21.907
maintenance building	€ 40.000	€ 40.000	€ 40.000	€ 40.000	€ 40.000
additional machinery costs	€ 44.231	€ 44.231	€ 58.506	€ 58.506	€ 58.506
other costs	€ 41.224	€ 41.224	€ 49.680	€ 49.680	€ 49.680
phosphate rights					
staffing costs					
lease/rent	€ 26.110	€ 26.110	€ 26.110	€ 26.110	€ 64.335
interest	€ 46.000	€ 46.000	€ 60.802	€ 122.428	€ 60.802
loan repayment	€ 70.000	€ 70.000	€ 91.451	€ 180.764	€ 91.451
private spending	€ 90.000	€ 90.000	€ 90.000	€ 90.000	€ 90.000
investments	€ 30.000	€ 30.000	€ 30.000	€ 30.000	€ 30.000
total spending	€ 713.663	€ 684.748	€ 943.901	€ 985.013	€ 872.299
net cash flow	€ 31.392	€ 55.207	€ 30.193	-€ 10.919	€ 101.795

Table 4. Results present situations and options on different People - Planet - Profit indicators

	Farm A					Farm B				
	Present situation M0	Option M1: Optimisation	Option M2A: Build new	Option M2B: Enlarge present	Option M3: Jerseys	Present situation G0	Option G1: Optimisation	Option G2: Grow without land	Option G3a: Grow with buying land	Option G3b: Grow with renting land
People Education/meetings	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Replacement rate	35%	20%	20%	20%	20%	30%	25%	30%	30%	30%
Grazing	Yes	Yes	Yes	Yes	Yes	Partly	Partly	Partly	Partly	Partly
MDV-stable	Nee	Nee	Yes	Nee	Nee	Yes	Yes	Yes	Yes	Yes
Planet Manure surplus in 1000 kg	0	0	778	778	0	1237	533	3171	0	0
Kg CO^2 eq. per 1000 kg milk	1319	1319	<1319	>1319	<1319	1224	<1224	>1224	>1224	>1224
Kg phosphate per 1000 kg milk	5,08	4,70	4,84	4,84	5,70	4,85	4,30	4,58	4,58	4,58
Kg methane per 1000 kg milk	26	<26	<26	<26	>26	23,8	<23,8	<23,8	<23,8	<23,8
Profit Result in €	-€27.170	-€25.479	-€93.925	-€53.546	-€24.787	€31.392	€55.207	€21.766	-€19.346	€101.795
Feed costs per 100 kg milk	€7,58	€7,61	€8,82	€8,82	€8,50	€8,97	€8,33	€11,02	€8,47	€8,47
Cost price per 100 kg milk	€38,72	€38,31	€44,49	€40,41	€45,88	€33,99	€32,77	€34,76	€36,35	€31,65

4. Stakeholder analysis regarding the development scenarios

In this research six interviews were held with representatives of different stakeholders, all of them have a role as farm advisor related to farming strategy. Below in table 5 are presented the opinions of the stakeholder on what are general important aspects to take into account for dairy farm development strategy evaluation.

Table 5. Important issues in farm development according to different stakeholders

ABN AMRO (bank/financial service provider):	Responsible entrepreneurship. Stay in close touch with society. Comply with the present legislation. Solve the manure surplus problem. Make more use of feed efficiency.
Friesland Campina (processor):	Being respected and valued highly through the society. Taking care for animals and nature. Be open for questions from citizens. Education for the youth. Make no barriers, be inclusive for joint care for a sector that is 'in balance'.
LTO (farmer organisation):	First of all have more clarity in the sector. Education. Bring the sector close to the society. Be into and connected to (inter)national and local politics. Derogation more in balance. Better financial rewards for the farmer in order to have a good income. More research on methane emissions and ammonia emissions. 81,2% of the cows are grazing. Mortality in calves must go down. Average age of cows has to increase. Smooth farm successions must be possible. One voice by the whole sector. Make more use of collected data.
ForFarmers (feed supply):	Reduce mortality in young calves. Healthy animals.
Economic and Legal Advisor:	Make sure that you are supported by the society, through biodiversity, grazing and being circular. Farmers have to be open for the societal and consumer interests in order to get a higher price and more diversity in the different off farm dairy streams.
Land Use Advisor:	Be proactive on climate change related actions, both regarding climate mitigation and climate adaptation. Acquire knowledge and collaborate on this subject. Grow your own concentrates. Use autumn grass as compost.

In table 6 on the next page, the relative importance of the selected PPP-performance indicators in decision making for new strategies according to their opinion is reported.

Table 6: Importance of indicators per stakeholder	Stakeholders					
	Friesland Campina	**ABN-AMRO**	**Economic and Legal Advisor**	**Land Use Advisor**	**ForFarmers**	**LTO**
Education	+	+	0	+	+	+
	To connect with society in order to maintain sales position	To connect with society to maintain positive image	Not mentioned as important	To learn from other farmers in study groups	To connect with society to maintain positive image	To connect with society to maintain positive image
Replacement rate	+	+	+	-	+	+
	Indicator for animal health	Indicator to reduce the costs price	Indicator to reduce the costs price	Not important	Indicator to reduce the costs price	Indicator to reduce the costs price
Grazing	+	+	+	-	-	+
	For image and sales markets	Image and agreement with government	For legislation and image	Manure better used when grazing	Not important	For legislation and image
MDV-stable	+	+	0	-	-	+
	Better sustainability and animal welfare	Sustainable building	Not important, but depending on objectives farmer	Not important	Not important	Better sustainbility and animal welfare
Manure surplus	-	-	+	+	0	-
	Not important	Not important	Manure legislation	Manure processing	Calculate manure shipping out	No manure problems
Kg CO2 per 1000 kg milk	+	-	-	+	+	0
	Environmental impact of CO2 emission	Not important	Not important	Environmental impact of CO2 emission	Environmental impact of CO2 emission	No opinion
Kg P2O5 per 1000 kg milk	+	+	+	+	+	+
	New phosphate production rights legislation	New phosphate production rights legislation	New phosphate production rights legislation	New phosphate production rights legislation	New phosphate production rights legislation	New phosphate production rights legislation
Kg methane per 1000 kg milk	+	-	-	+	+	0
	Environmental impact of methane emission	Not important	Not important	Environmental impact of methane emission	Environmental impact of methane emission	
Result in €	-	+	+	-	+	+
	Not important	Profit required for investments	Keep farm profitable	Not important	Keep farm profitable	Keep farm profitable
Feed costs per 100 kg milk	-	+	+	-	+	+
	Not important	Important for costs and profit of farm	Important for costs and profit of farm	Not important	Important for costs and profit of farm	Important for costs and profit of farm
Cost price per 100 kg milk	0	+	+	-	+	+
	Not so important as long as the farm is profitable	Important for costs and profit of farm	Important for costs and profit of farm	Not important	Important for costs and profit of farm	Important for costs and profit of farm

Below in table 7 are presented the opinions of different stakeholders on the different farming strategies of the two farms.

Table 7. Opinions of the different stakeholders on the farming strategies of farm A and B	
Farm A and Farm B strategy 1, Optimising	
+	To invest a little for a better results is always very cost effective (ABN-AMRO, Friesland-Campina, Economic and Legal Advisor, LTO, ForFarmers, Land Use Advisor)
-	Risk of higher milk production leading to higher phosphate excretion, especially when the stable has enough space (Economic and Legal Advisor)
+	For farm B a new breeding strategy with Jerseys could be a good option because of the available places in the new barn (Economic and Legal Advisor)
Farm A, strategy 2, Build new (2A) or Enlarge present barn (2B)	
+	To expand the farm a bit or to renovate a bit, especially in case of overpopulated barn (ForFarmers, Land Use Advisor).
-	New building brings many risks: profitability, phosphate and land bound production rules (ABN-AMRO, ForFarmers, Economic and Legal Advisor, Land Use Advisor)
Farm A, strategy 3: Jerseys	
+	Efficient milk production is an opportunity, for finance and environment (ABN-AMRO, Land Use Advisor,
-	Health status of cows you buy, difficult option if you want to raise your own youngstock (LTO)
-	Jersey bull calves are a problematic side product (LTO)
-	There will be not enough space for more cows (Economic and Legal Advisor)
-	there is no way back (ForFarmers)
Farm B, strategy 2: Grow without extra land	
+	In some cases possible and financial attractive (ABN-AMRO)
-	Land bound production rules makes this impossible (LTO, Economic and Legal Advisor, ForFarmers)
-	Ecological improvements are not possible this way (Land Use Advisor)
Farm B, strategy 3: Grow with land (owned- 3A, rented- 3B)	
-	Financially not possible because of new legislation (ABN-AMRO, Economic and Legal Advisor, LTO)
+	Renting is an opportunity, possibly through collaborations with arable farmers (Forfarmers, Land Use Advisor)

5. Discussion and conclusions regarding development strategies

There are many factors influencing the differences in farm setup and farm types that you can find in De Achterhoek. In this study focus was on intensive farming and extensive farming, but that does not seems to be a very dominant factor for choosing a different farming strategy. The farms studied were very different, however not only from perspective of intensity.

In this research 11 indicators were selected to evaluate the farming strategies. The chosen indicator for the financial feasibility is annual result on cash flow basis. This is because it shows best the financial risks in the different plans and showing best the influencing factors. In discussion with the farmer the difference between cash flow based calculations and economic profit based calculations should be explained. The cost price is also an important indicator, it should be presented on economic valuation from long term perspective. However, in this research only the short term cash based perspective was used.

The following indicators should also be taken into account because they might be influenced very much by sector developments and can be seen as 'planet indicators' as well:

- Feed costs per 100 kg milk
- Shipping out manure in tonnes
- Kg phosphate per ton milk

The following indicator is taken into account because of the legal impact it has in new building and because of the environmental and welfare aspect involved:

- Having a stable according to 'Maatlat duurzame veehouderij' (MDV)

The following indicators were taken into account because of the consumer trust aspect, as well as the sectoral political as well as they are important 'people/animal welfare' and 'planet' indicators

- Open towards society / education
- Replacement rate
- Grazing
- Kg CO^2 per ton milk
- Kg methane per ton milk

For each farm three different strategies are developed, based on the farm interview and analysis of internal and external farming business environment factors. Estimating consequences of these scenario's is important. The estimations were done before the stakeholder interviews took place, however the results were not communicated with them. This was done on order not to influence their opinions.

According to the interviewed stakeholders for development of a strong dairy sector in the region farmers have to develop strategies that are:

- social acceptable
- fitting the interests and motivation of the farmers as best as possible
- good for animal welfare
- pro-actively taking the broad spectrum of economical and societal interests into consideration
- profitable

From the stakeholder perspective investments in land and buildings are not advisable because of the present uncertainties in dairy farming. Stakeholders have different opinions on the introduction of new breeds in the stable, i.e. Jersey. Some stakeholders see options for collaborations with arable farmers for further farm development.

Overall, the best strategy seems to be optimising the present situation. This is mainly because:

- Uncertainties in present government policies and legislations
- Easy to realise with low costs
- Improving technical- an financial farming results, as well as replacement rate and emissions

With optimisation is meant:

- Reduce the number of youngstock towards 5 per 10 milking cows
- Reduce first calving age heifers at 22 months, improve calf raising practices
- Reduce the replacement rate of the dairy cows (<25%)
- Improve feed efficiency and produce as much milk as possible from roughages
- Reduce the inter calving interval, however take production level into consideration
- Improve the housing system by focussing on improvement of animal welfare with minor adaptations
- Proper selection of cows and bulls for culling and breeding
- Try to increase fat, protein and lactose content per kg of milk as much as possible

6. Recommendations

The research was a learning full experience for the students, farmers, researchers and teachers (in their role as student coaches) involved. The approach could be used as a minor focussing on dairy farm strategy evaluation. Methods applied in the research should be more transparent for students, coaches, farmers and stakeholders, i.e. to create stronger involvement of farmers and stakeholders formats for discussing strategy results should be made available for the students in advance.

It is difficult to estimate, weigh and evaluate the future impact of the different indicators, however using the indicators is important in the decision making process. It will be best to ask farmers their specific goals and the importance regarding these indicators. Next ask stakeholders about their opinion on specific indicators. It clarifies the backgrounds of specific advices, which helps understanding the differences in the advices per stakeholders.

It would be best if stakeholders were visited twice each. In that case the first visit it should be clear which kind of strategy they prefer, and how they think the strategy should look like. In the second visit they should be confronted with the chosen optional strategies and the expected outcomes of the strategies.

Annex 1: Indicator list

Possible performance indicators on People, Planet and Profit

People:

External

- Longevity cows in years
- Somatic cell count
- Antibiotics ADD (ADD = Average Daily Dose)
- Hours grazing by cows per year
- Percentage replacement dairy cows
- Percentage calf mortality
- Cost pesticides, calculated as costs pesticides per hectare or kg milk
- Use of fertilizers
- Subsidies: high amount subsidy is lowering the score for People
- Subsidy nature conservation: high score is higher the score People
- Number of days hosting information to non-farmers
- Score for fitting the farm in the environment (score to be defined)
- Number of shelter and feeding places per cow
- Is the stable awarded as sustainable stable according to the MDV aspects
- Apply measurement/policy to prevent cattle diseases (e.g. vaccination)

Internal

- Number of households
- Number of paid working hours
- Successor
- Net worth €
- quality work environments
- lost time caused by incidents
- number of hours grazing young cattle
- skin damaged for young cattle
- Welfare Quality lameness
- Percentage finally pregnant by insemination
- The flexibility for labour, number of people prepared and willing to help the farmer
- Score for long term durability (score to be defined)
- Use of AMS

Planet

- Kg CO_2-equivalents per kg milk
- Primary energy in MJ per kg milk
- Phosphorus excretion in g per kg milk
- Nitrogen efficiency cattle

- Nitrogen surplus in kg per ha
- Percentage home grown feed in cows' ration
- Energy sold
- Percentage soil organic matter
- MJ fuel used per kg milk
- Scoring for the biodiversity of the grassland (score to be defined)
- Special efforts for biodiversity: number of ha of extensive manure grass or fallow land.
- Number of ha with bird and/or nature management related use
- Price in € received by dairy processor thanks to sustainability.
- Waste of meat: number of (dead) livestock units rejected for meat consumption
- Water use per cow
- Methane emission per cow
- Clear of common diseases like salmonellosis, Bovine virus diarrhoea and Para tuberculosis

Profit

- Feed costs per kg milk
- Cost price of milk / critical milk price
- Long term debts per kg milk
- Farm income per unpaid Annual Work Unit
- Modernity (bookkeeping value as percentage of replacement value)
- Kg milk per hour labour
- Costs health dairy cattle per kg milk
- Income per hour/AWU
- net operating income
- Return on investment
- Ratio net worth and debts
- Investments per kg milk
- Variable costs per 100 kg milk or per cow
- Solvency
- Profitability per Ha
- Price sold calves for breeding
- Financially resilient (to be defined)
- Score on efficiency from the "Annual Nutrient Cycle Assessment" (Dutch: 'Kringloopwijzer', cycle indicator initiative for the sector).
- Diversification in revenues: share of farmer's revenues that does not only rely on the milk price.
- Ratio rental land versus owned land
- Costs for manure processing
- Costs for purchased roughage per cow