SDDC Farm Development project 2015/16

Differences between and within dairy farming systems

2016-03-01 Alfons Beldman, Co Daatselaar, Shixian Zhai, Junfei Bai, Jelle Zijlstra, Kees de Koning

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- Differences in farm performance between and within different farming systems:
- Intentions and expectations
- Overall conclusions and recommendations
- Appendix: study for Dutch situation

This research was executed within SDDDC and its related program the Dutch Public Private Partnership SDDDC (AF 14247 (TKI Agri & Food), BO-27.04-001-014)

Introduction

- Survey SDDDC dairy farms
  - Developed in cooperation with Dr Junfei Bai (CAU)
  - Conducted by CAU and SDDDC
  - Integral survey
    - Farm structure (herd, land, machinery, staff)
    - Farm management (feeding, manure, use of software)
    - Economics (loans/debts, gross margin)
    - Performance (productivity, environment)

Introduction

- Survey SDDDC dairy farms
  - Survey was conducted in July – October 2015 by graduate students from College of Economics & Management (CEM), coordinated by Junfei Bai (CAU) and Liu Kai (SDDDC)
  - Total sample: 126 farms
  - First analysis by Shixian Zhai and Junfei BAI (both CAU), presented on December 7th 2015 at CAU, part of their results is used in this presentation.
  - Dataset is further analysed by Wageningen UR, using the same farm size classes
  - For most graphs and tables data of 90-100 farms could be used; only for feed costs and margin it was around 55

Introduction

- Goal of analyse
  - To get insight in performance of different farm types using performance indicators
    - that fit with regional circumstances
    - and, as a set of indicators, give an integrated picture of the overall performance
  - To get insight in differences in performance within farm types
    - To get insight in room for improvement

Choice of performance indicators

- For the overall picture of performance of a dairy farm indicators are required for:
  - People (e.g. labour circumstances, safety, milk quality, use of antibiotics, animal welfare)
  - Planet (e.g. losses of N and P, greenhouse gas emissions)
  - Profit (e.g. productivity, gross margin, total costs)
- The choice of indicators for this analyse was based on:
  - Critical factors for Chinese dairy production, partly based on the white paper
  - Availability of data.

Choice of performance indicators for Chinese dairy

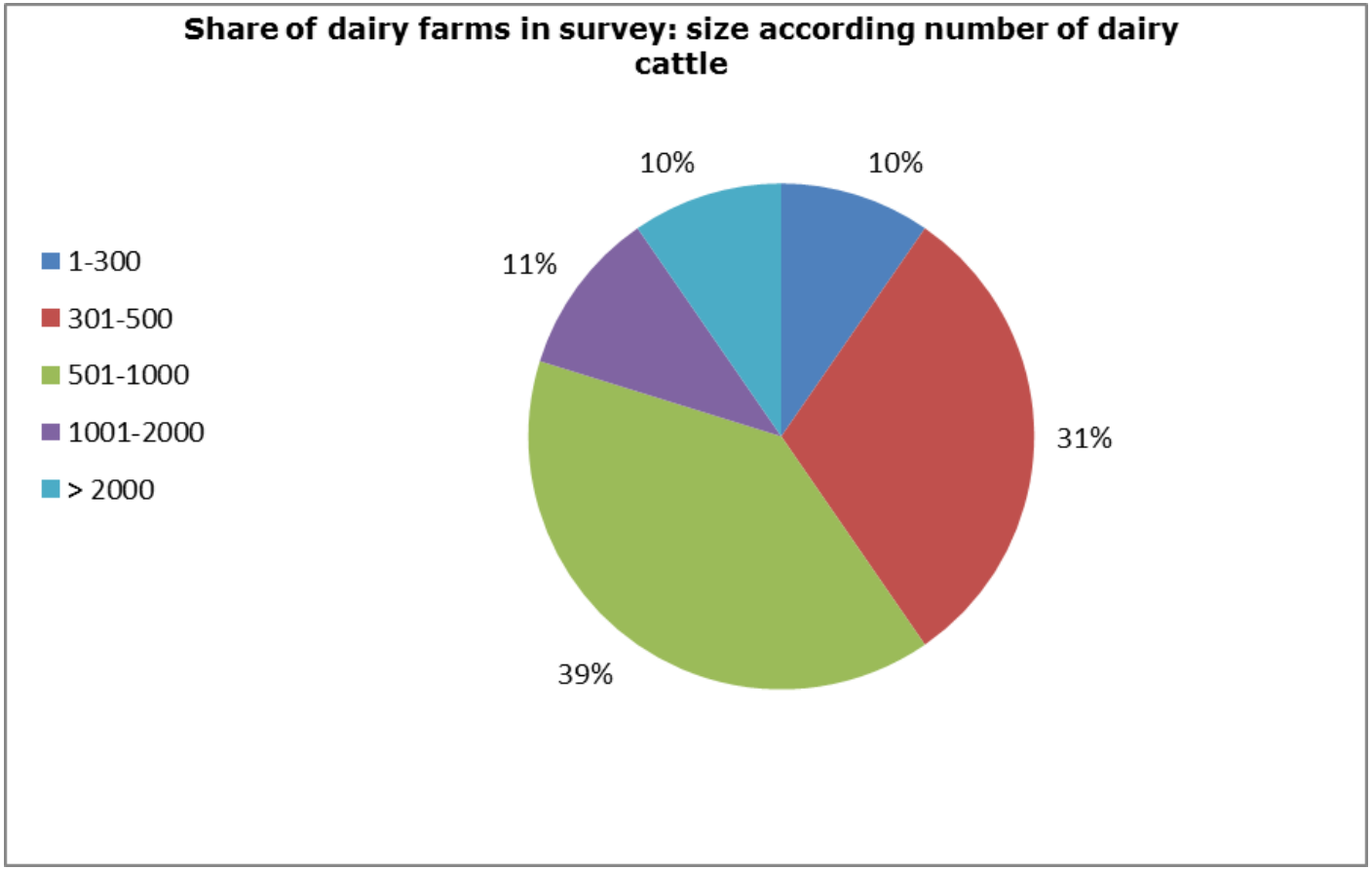
- **Performance indicators used in this study:**
  - Milk quality (SCC, TBC, milk refusal)
  - Milk yield/cow, cows/labour unit
  - Milk price, feed cost, milk-feed margin, labour costs

Information was collected on ration of the animals, but it appeared to be insufficient to be able to calculate N and P efficiency indicators.

Respondents in the survey according to number of dairy cattle on the farm

- Respondents from provinces Hebei, Tianjin and Beijing

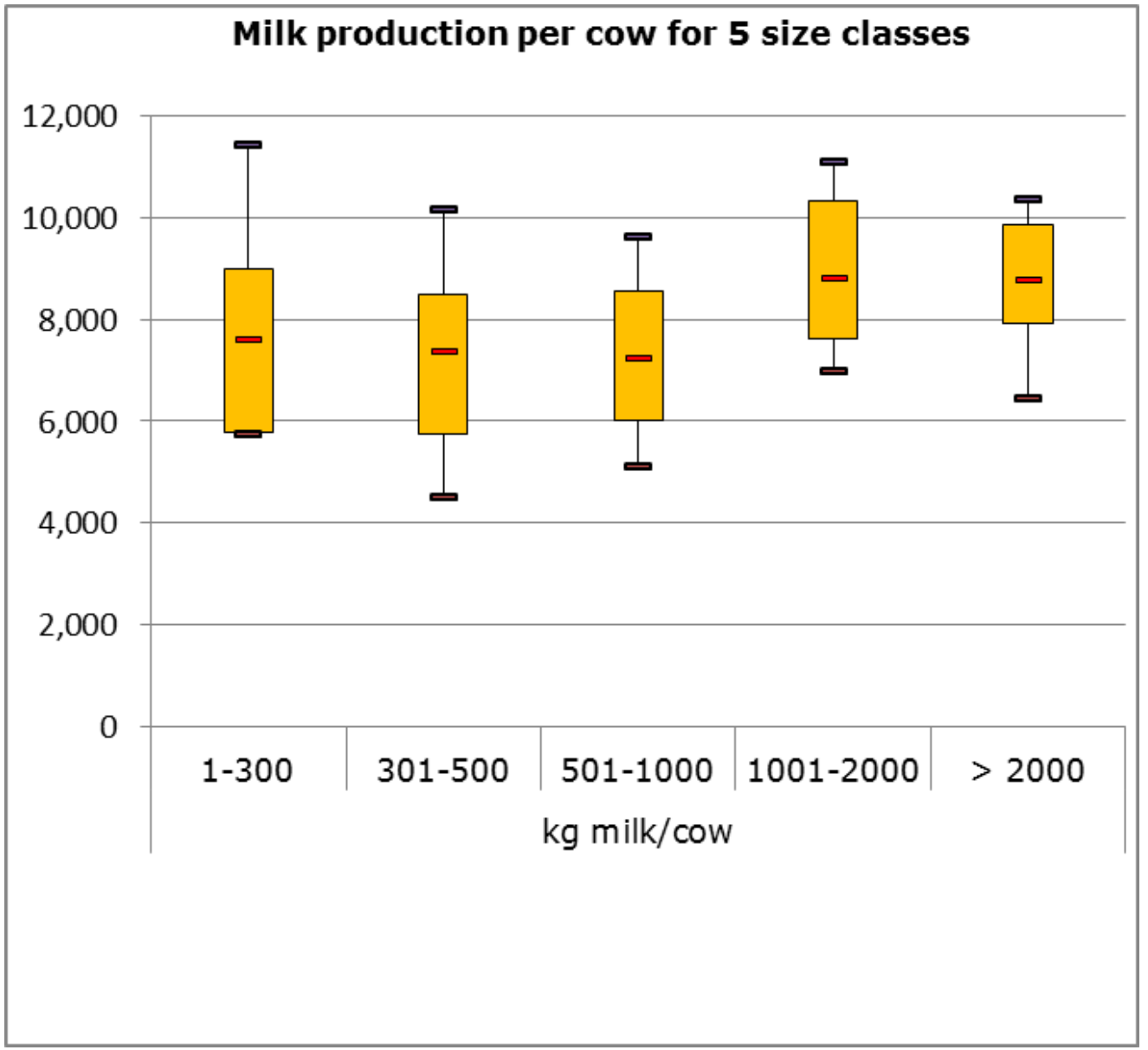
(Note: nr of dairy cattle is total number including young stock)



Farm management: kg milk per cow

- Mark in box is average
- 25-75% in yellow boxes
- 2.5-97.5% between the whiskers

- Larger scale farms show higher milk yield
- Differences with farm types big: much overlap between groups



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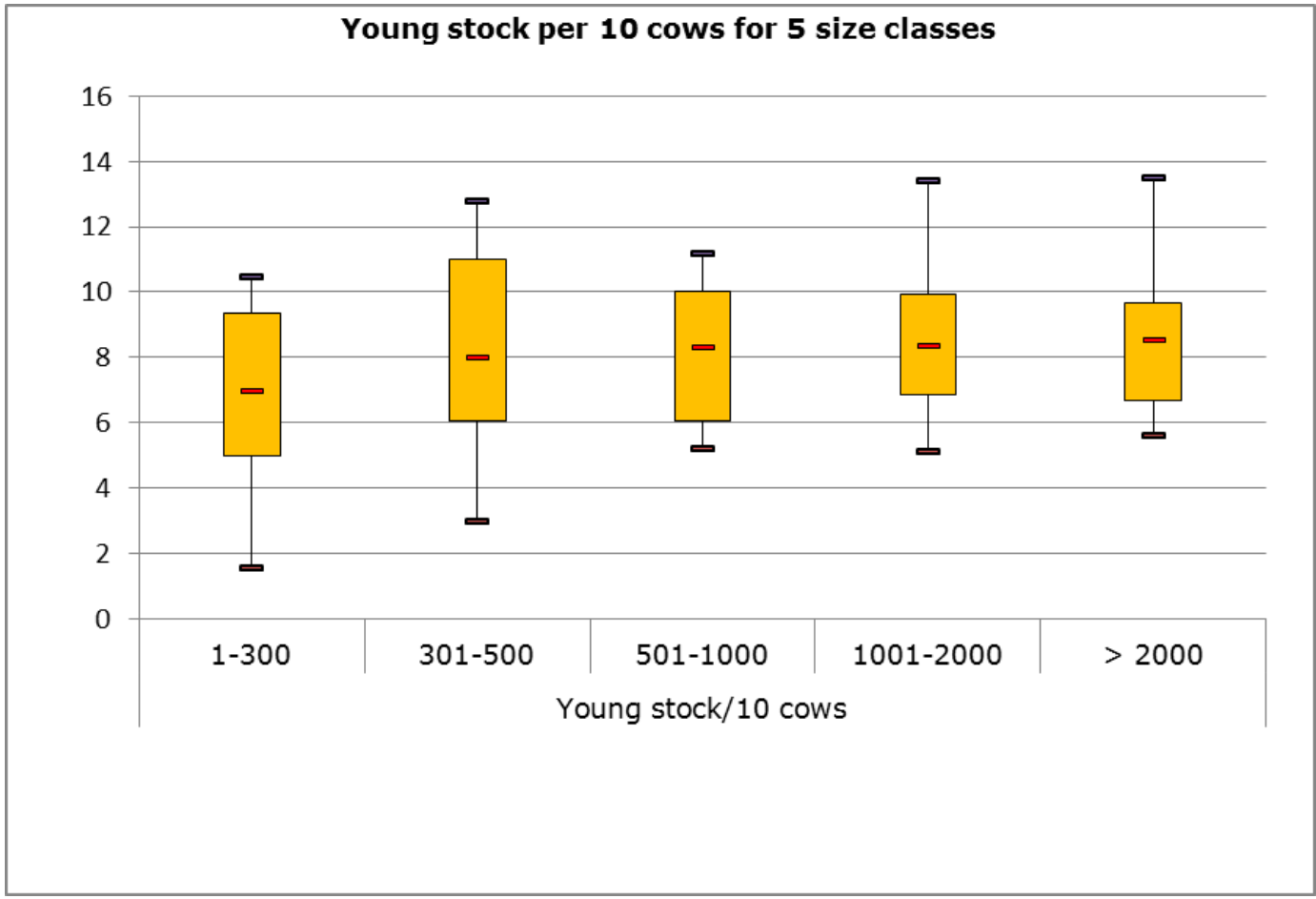
Farm management: number of young stock per 10 dairy cows

- No clear differences between the size classes

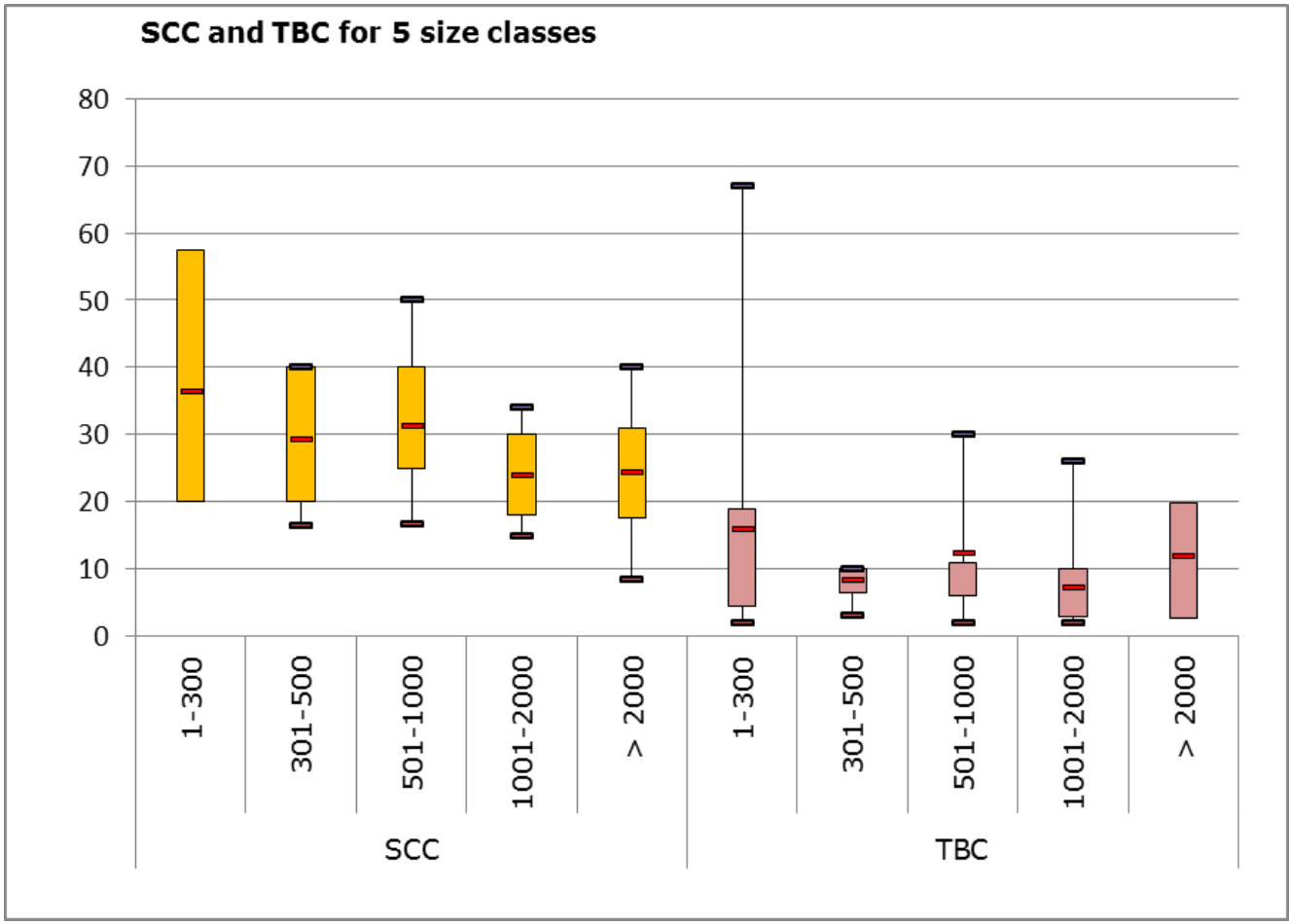


Farm management: number of cows per employee

- On bigger farms more cows per employee

Milk quality: SCC and TBC

- Bigger farms tend to have lower SCC, for TBC no clear pattern
- Smaller farms seem to have more outliers
- Several farms higher then international thresholds for SCC and TBC
- Level SCC Western Europe 100-200000
- Level TBC US and Western Europe < 10000



SCC: *10000 per ml (40 = 400.000 = EU treshold)

TBC: *10000 per ml (10 = 100.000 = international treshold)

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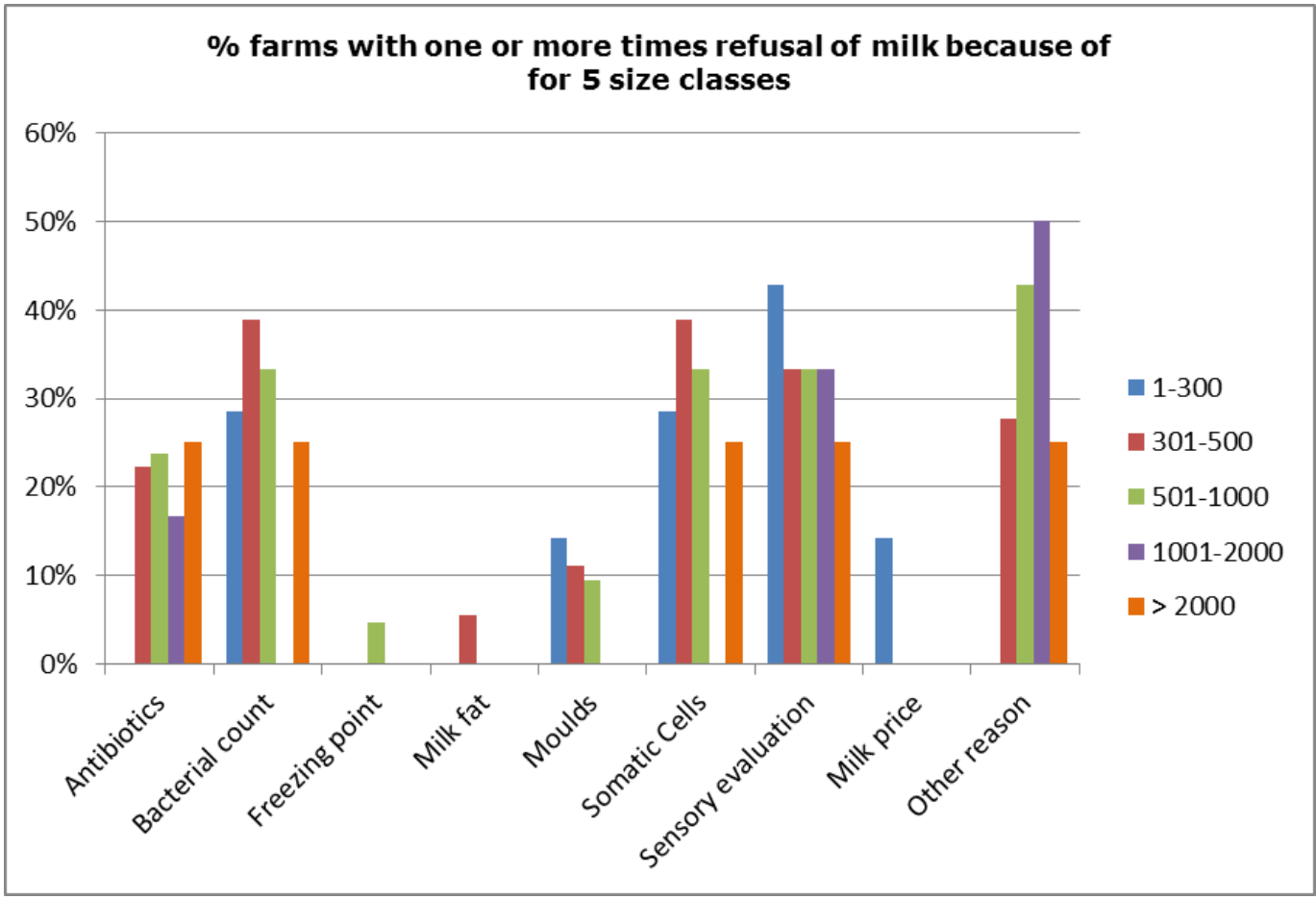
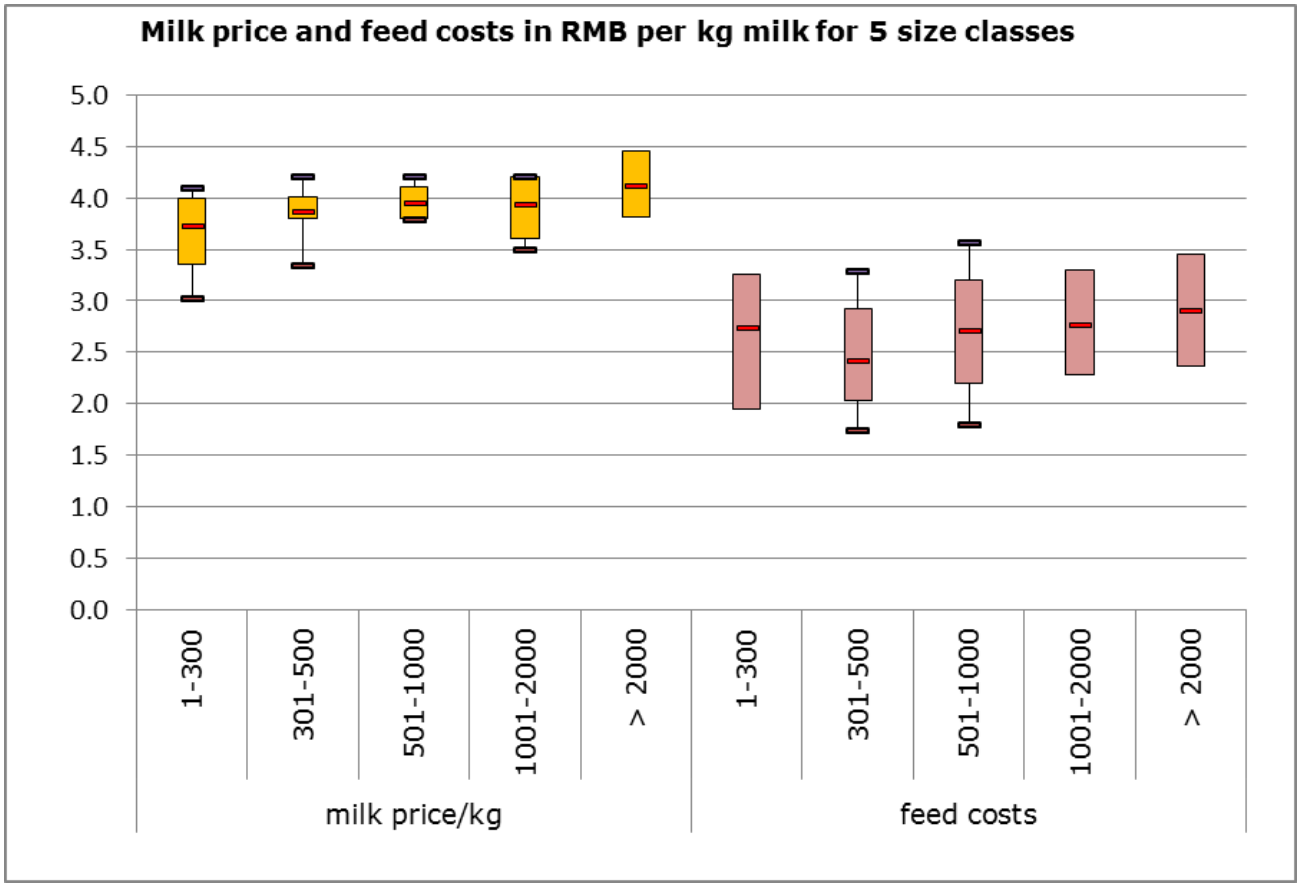
Reasons for refusal of milk

- Most refusals because of sensory evaluation, followed by TBC and SCC
- Nearly all farms have refusals: no effect of farm size



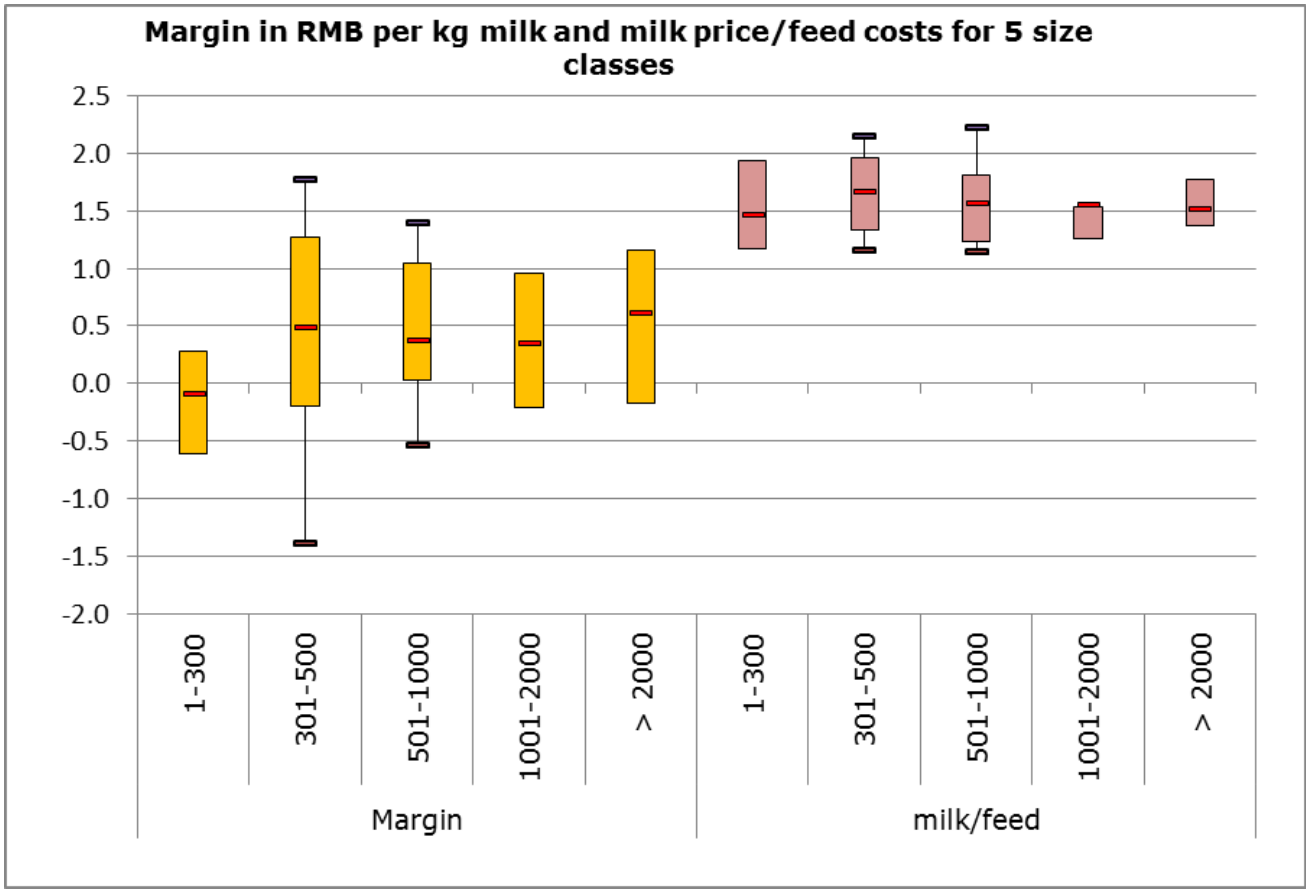
Milk price and feed costs in RMB/kg milk

- Bigger farms tend to have higher milk price
- Feed costs tend to rise from 2nd to last farm type
- Feed costs: large variation within farm types: room for improvement!



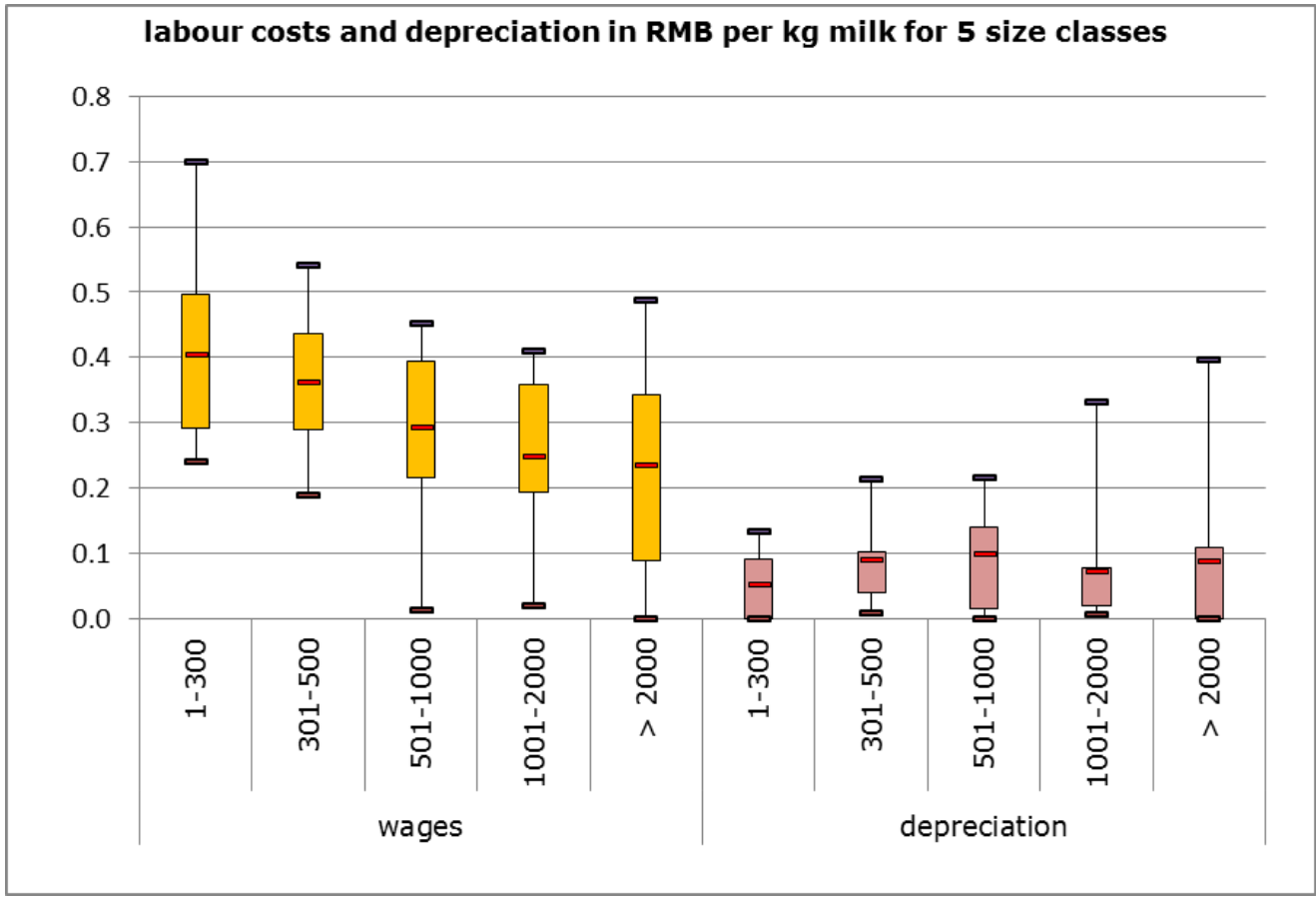
Margin milk-feed and milk price/feed costs

- Bigger farms tend to have lightly higher margin milk over feed
- Smallest scale has smallest margin
- Variation within each farm type is high: room for improvement



Labour costs and depreciation

- Bigger farms tend to have lower labour costs.
- Compared to feed costs, labour costs are limited (feed costs 5-6 times labour costs)
- Depreciation are minor costs, no clear differences between the groups



Depriciation includes (% of investment): feeding and milking equipment (8%), milking hall, barn (5%), ventilation, power equipment (6.7%), manure related equipment (10%)

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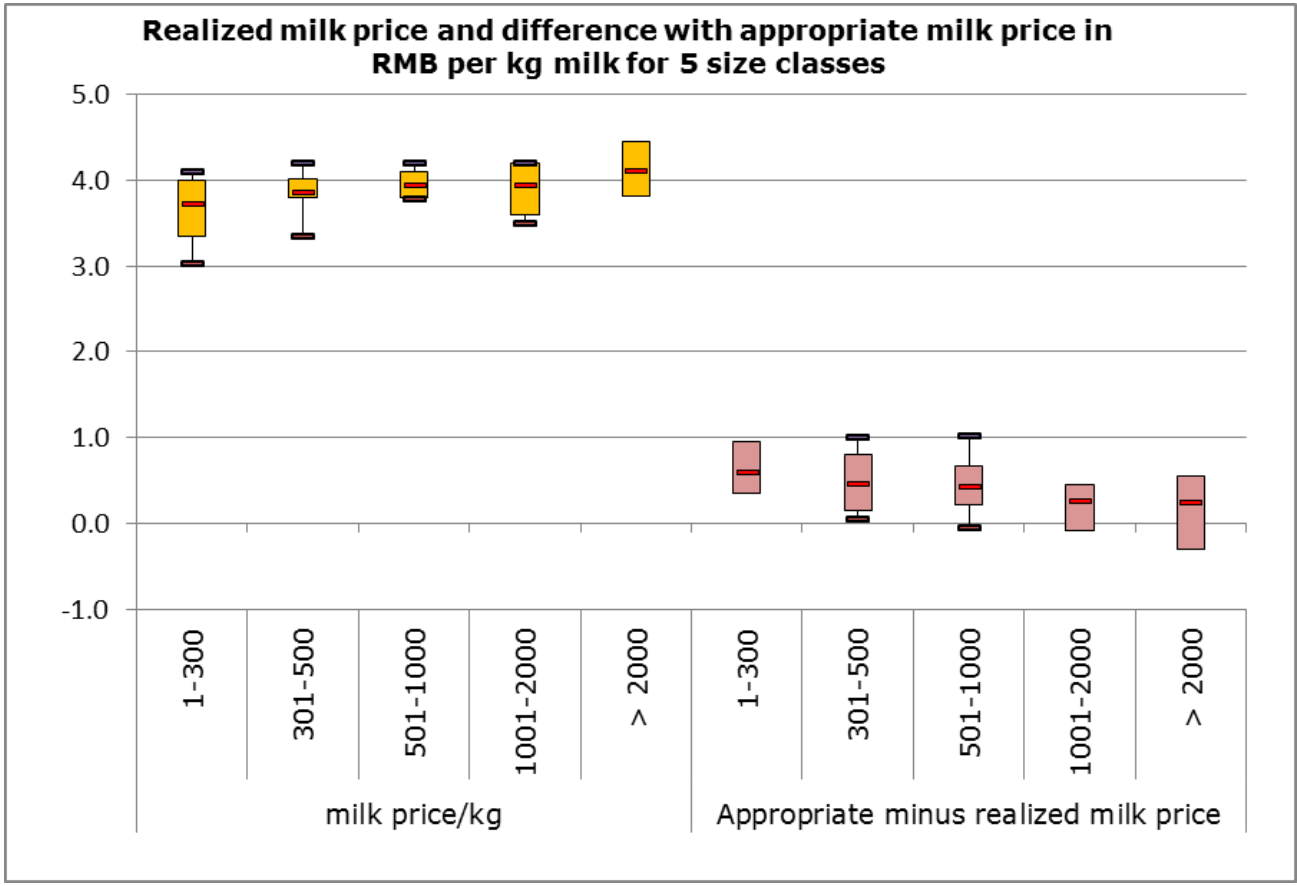
Realized milk price and difference with appropriate milk price

- The appropriate milk price is about 4.5 RMB. This return is needed to cover the costs.
- The gap between the appropriate milk price and the realized milk price 0-1 RMB per.



Interim summary (1)

- Majority of surveyed dairy farms 300-1000 dairy cattle
- Milk yield per cow somewhat higher on larger farms
- Milk quality: more negative outliers on group of smallest farms. Not much difference between other groups.
- Milk quality big issue:
    - Nearly every farm has one or more refusals of milk
    - Main reasons sensory evaluation, SCC and TBC
    - SCC and TBC quite often above international thresholds
- Milk price nearly 4 RMB/kg (€0.50-€0.55; $0.60-$0.65)
    - About 4.5 RMB/kg milk considered as appropriate (to cover the calculated costs)
- Larger farms have higher milk price, but also somewhat higher feed costs

Interim summary (2)

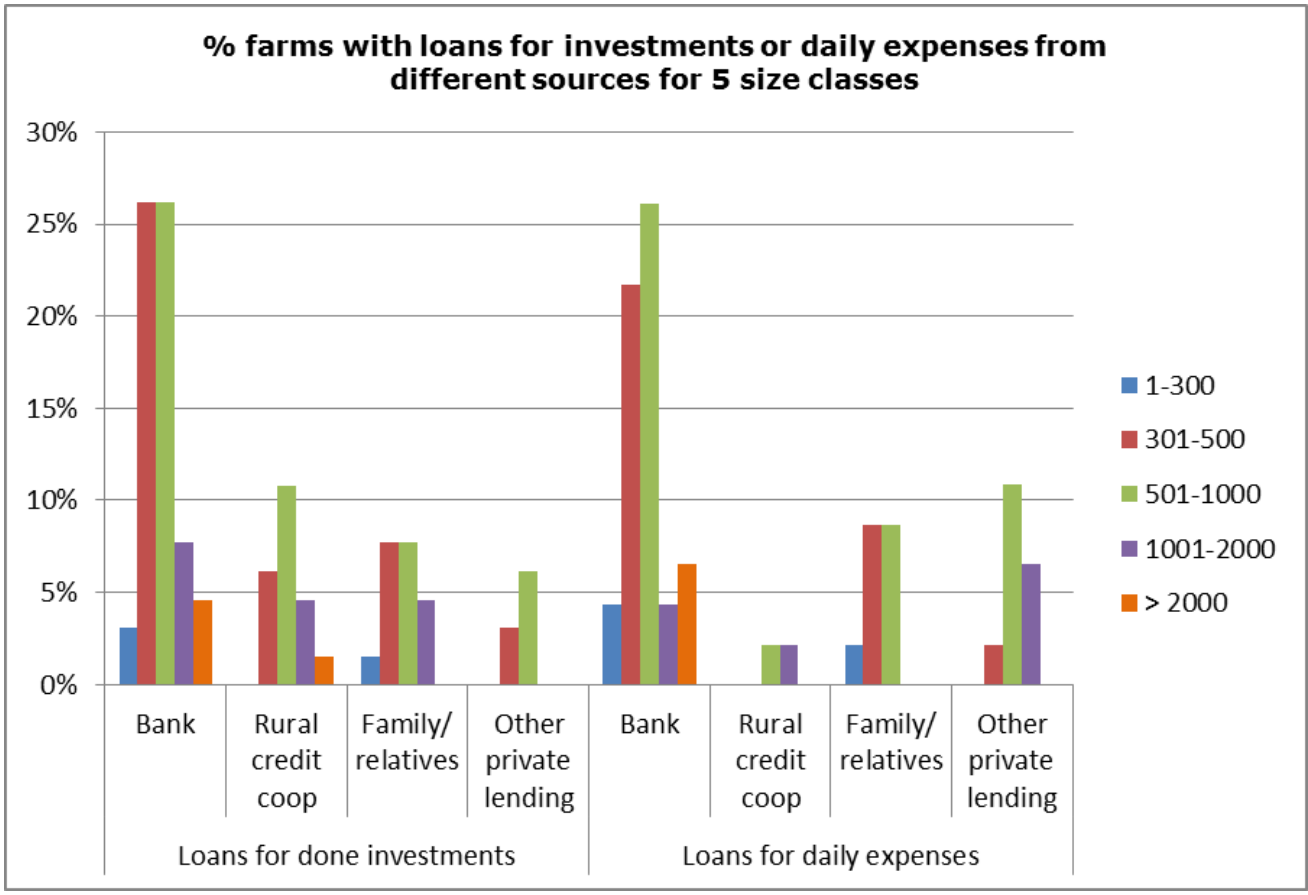
- Ratio milk price /feed costs about 1.5: feed major costs. This means margin is heavily influenced by variation in feed costs and cannot be controlled by the management. (Ratio milk/feed in Netherlands 3.5)
- Margin is lower in the group of smallest farms, not much difference between the other groups
- Tendency of less labour/kg milk on bigger farms, no/small differences other costs
- Differences within farm types are big for almost all indicators, this suggest there is room for improvement on many farms
- Calculated margin is rather low and does not include all costs. Taking into account the volatility of feed costs this means the systems are quite vulnerable.
- Addition of indicators like total costs, longevity and N- and P-efficiency could give a more balanced view of the overall performance

Intentions and expectations

- The survey also included questions related to plans for investment and need and availability for loans.

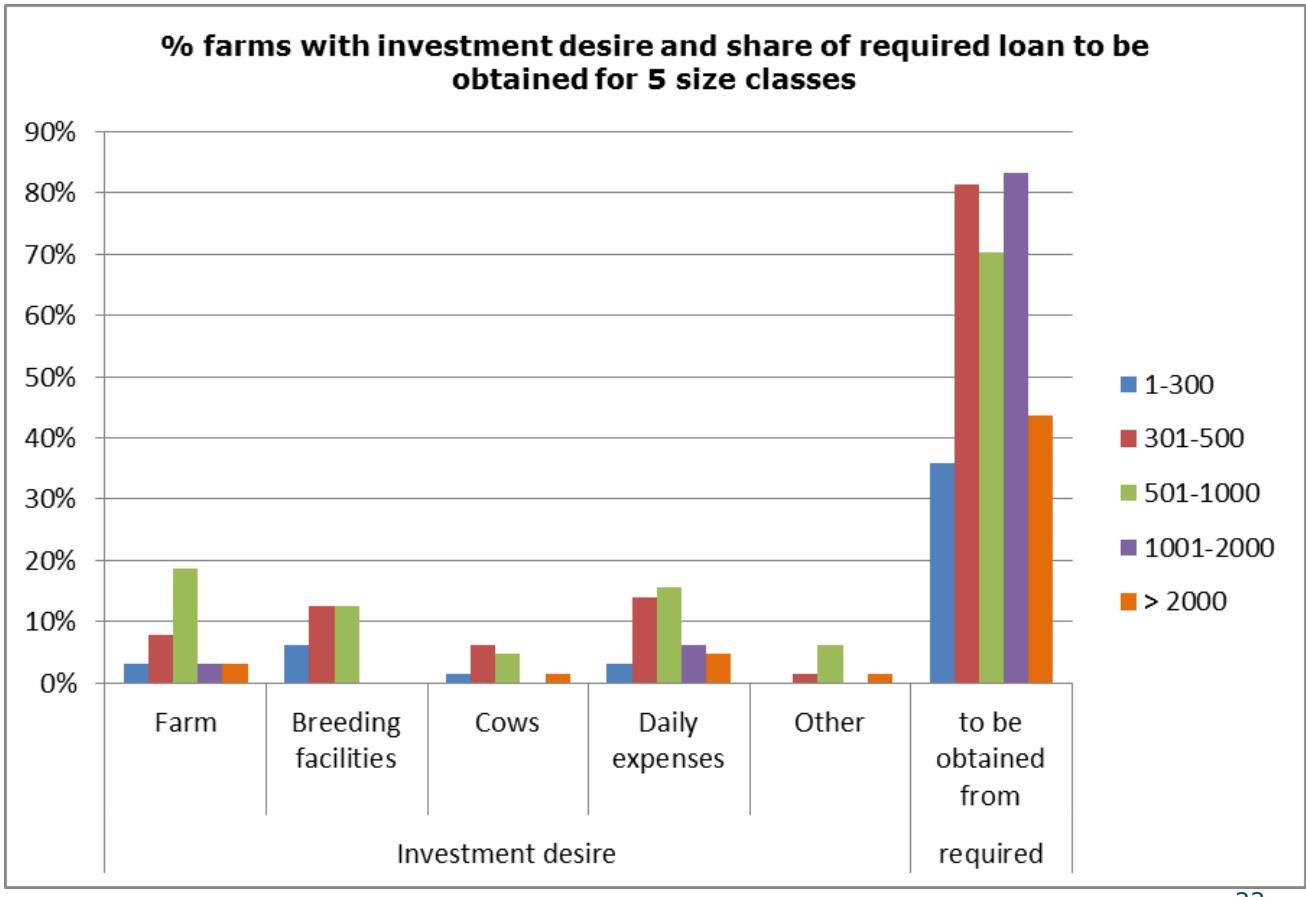
Realized loans for recent investments and daily expenses classified into sources

- Farms between 300 and 1000 heads are the main borrowers
- Banks are the main lenders
- Considerable number of loans from other sources



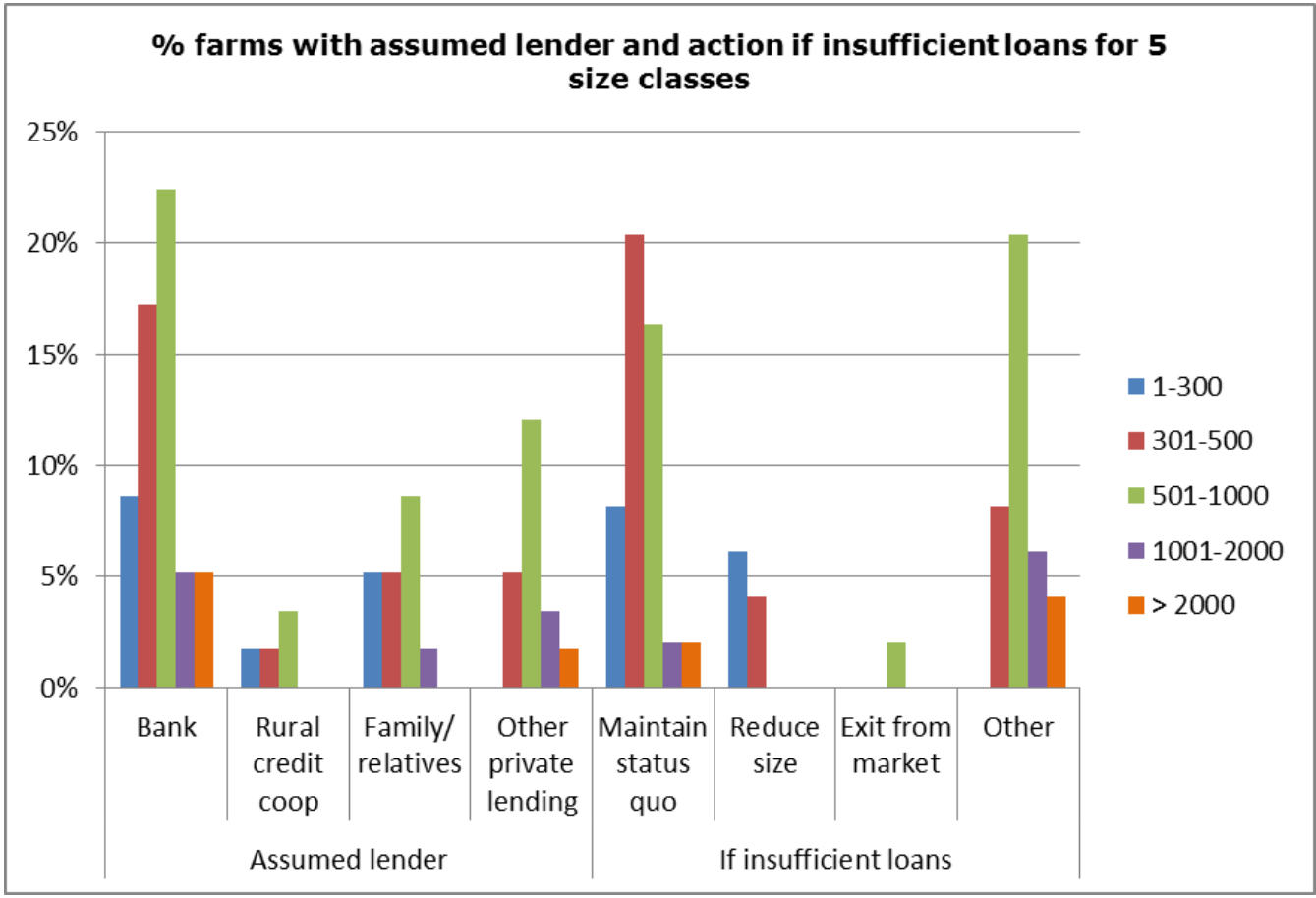
Investment desire and share of required loan that can be obtained (according to the farmer)

- Quite a number of farms needs loans for daily expenses
- Especially smallest and biggest farms expect not to obtain the required size of loans



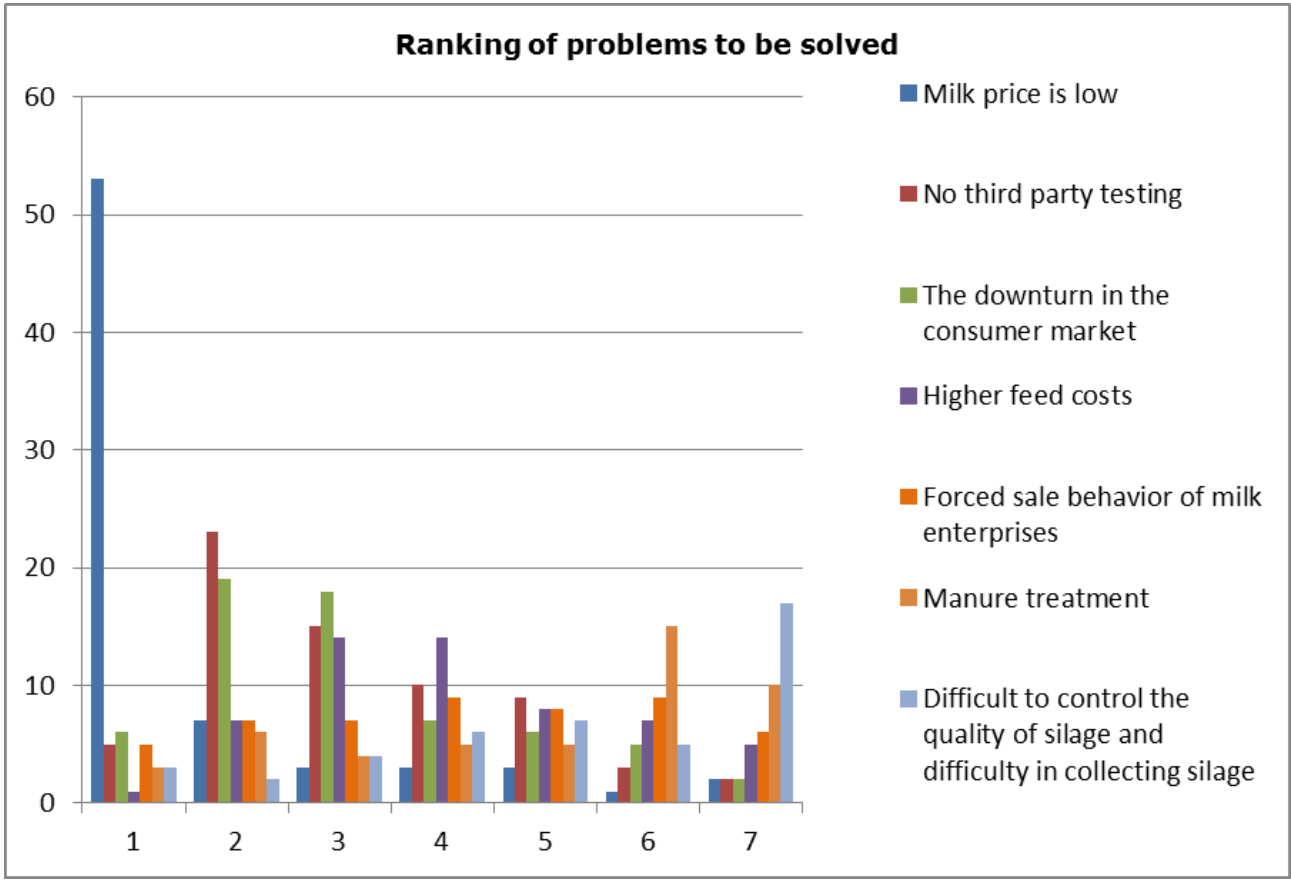
Assumed lender(s) for new loans and foreseen action in case of insufficient loans

- Other sources for loans in total as often as banks
- Alternative strategy if insufficient loans are available: status quo.



Main problems to be solved according to the farmers

- Low milk price is most often ranked as no 1 problem
- Independent testing within the chain is in second place
- Downturn consumer market in third place



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Intentions and expectations: summary

- Banks are main lenders, but also considerable number of other sources available
- Quite a number of farms need loans for daily expenses
- Top 3 of main problems to be solved according to the farmers
    - Low milk price
    - Independent test of milk quality
    - Downturn of consumer market.

Overall conclusions and recommendations

- Some differences between farm types: the group with smallest farms tends to have more outliers with milk quality, a lower milk price and lower margins. Differences between other groups rather small
- The differences within groups are much bigger than the differences between groups. This shows that there is room for improvement.
- All farm types are vulnerable for volatile feed costs: feed costs are a high percentage of total costs and margins are relatively low.
- A large share of the farmers with smallest and largest scale farms expect that they cannot get the required/desired loans.
- With some additions this survey could give a balanced picture of the overall integral (triple P) performance of the different farm types. For the Chinese circumstances total costs, N and P efficiency and longevity should probably be added.

Overall conclusions and recommendations

- The large differences within farm types show that there is room for improvement for many farms. Tools to achieve this improvement are:
  - Use of bench mark tools to compare results of a specific farm with a peer group of farms with a similar farm structure
  - Exchange of best practices between farms e.g. by e-tools or in discussion groups
  - Suggestion is to use results of this survey to discuss in a workshop with e.g. dairy economists and/or farm managers if and how this type of information could be used.
- In order to assess integral performance (triple P) of different types of dairy farms a structured and continuous data collection is needed:
  - Stratified sample of farms spread over different regions
  - Choice of right triple P indicators and aligned integral data collection
  - Continuous data collection (yearly of bi yearly) to be able to analyse trends

Appendix: similar type of analyse based on Dutch data

SDDC Farm Development project 2015

Differences: between and within dairy farming systems in the Netherlands

2015-12-07, Alfons Beldman & Co Daatselaar

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Contents

- Introduction
- Differences in farm performance between and within different farming systems:
  - Survey China
  - Dutch case: comparing two farming systems
  - Risk profile: dependencies and resilience
- Value of integrated and continuous data collection
- Benchmarking
- Concluding remarks

Introduction

- Survey SDDDC dairy farms
  - Developed in cooperation with Dr Junfei Bai (CAU)
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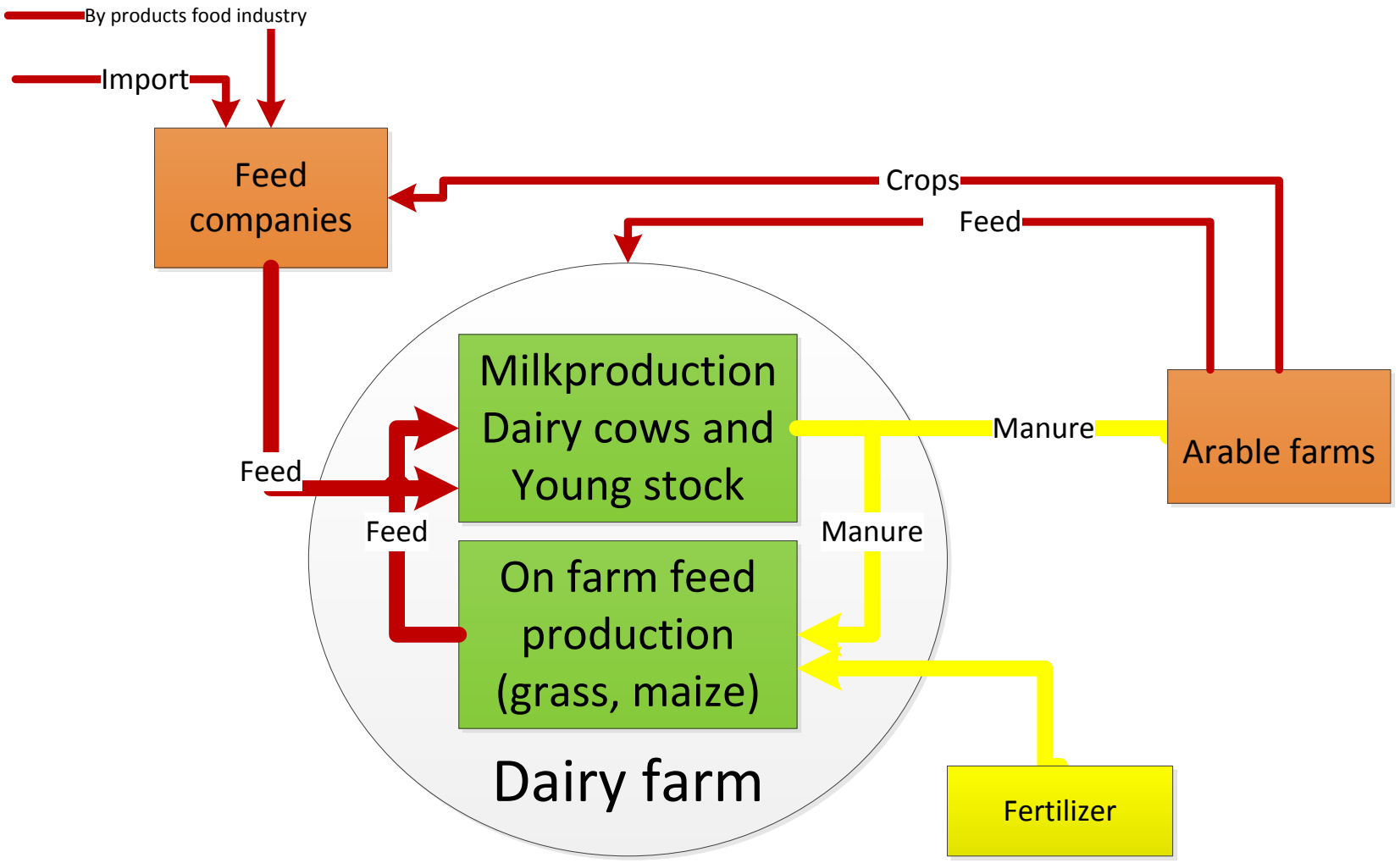
  - Integral survey
    - Farm structure (herd, land, machinery, staff)
    - Farm management (feeding, manure, use of software)
    - Economics (loans/debts, gross margin)
    - Performance (productivity, environment)
  - Data has been collected in 2015, will be analysed in 2016

Comparing two farming systems: Dutch Case

Dairy farm

Comparing two farming systems: Dutch Case

Comparing two farming systems: Dutch Case

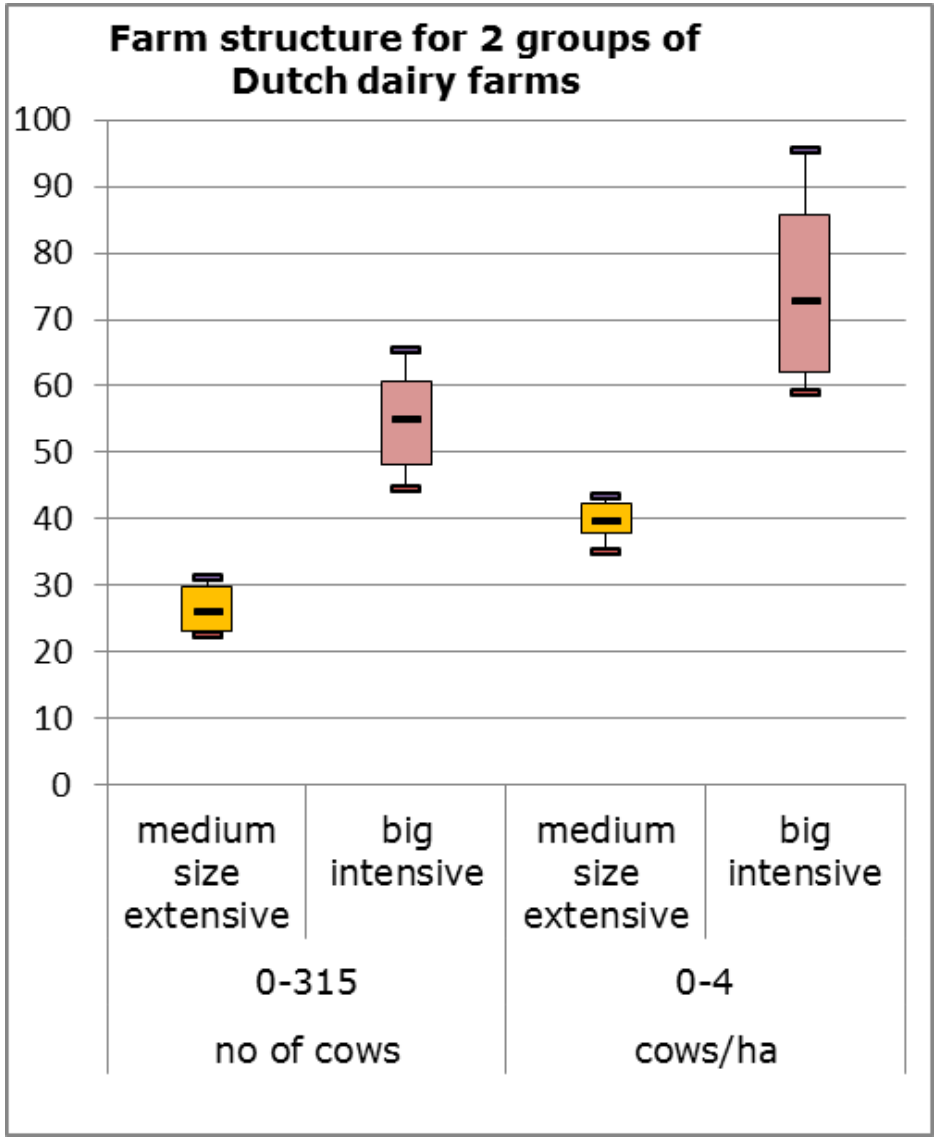


Comparing two Dutch farm types: classification

- 'Medium size extensive'
  - 60-100 cows
  - 1.3-1.7 cows per ha
- 'Big intensive'
  - 120-250 cows
  - 2.2-4 cows per ha
- Recognizable farm types for the Netherlands
  - It is expected that these types will continue in future

Farm structure: characterizing features

- No of cows: 100%=315
- Cows/ha: 100% = 4
- 25-75% in the boxes
- 10-90% between the whiskers
- Mark in box is average



Average	Med ext	Big int
No cows	82	173
Cows/ha	1.5	2.8

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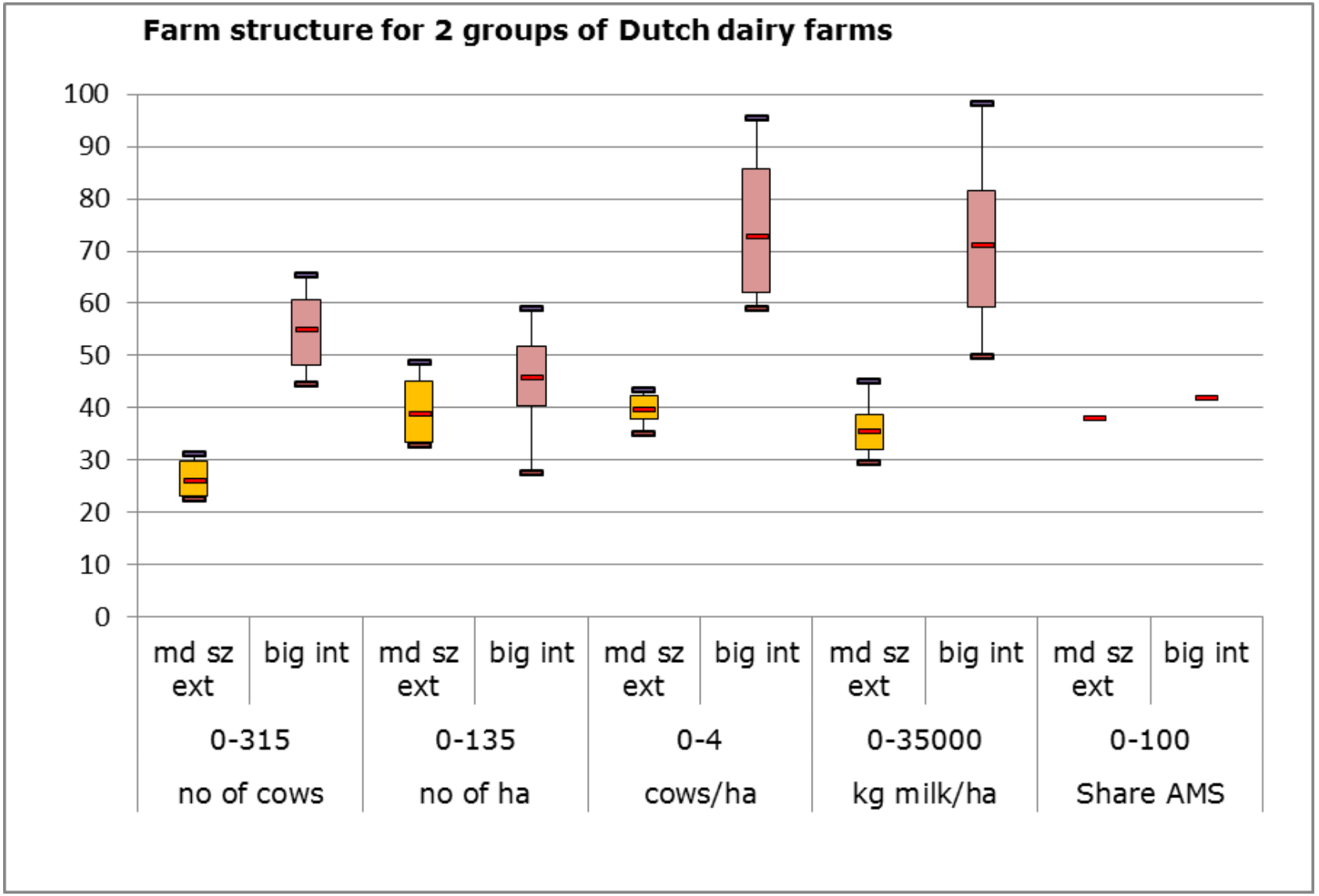
Farm structure of Dutch dairy farms

	Dutch average	Medium size ex-tensive	Big intensive
Dairy cows	93	82	173
Fodder crops (ha)	50.2	53.3	62.8
Dairy cows/ha fodder crops	1.85	1.55	2.83
Kg milk/ha fodder crops	14800	12483	24999
Automatic milking system	23%	38%	42%

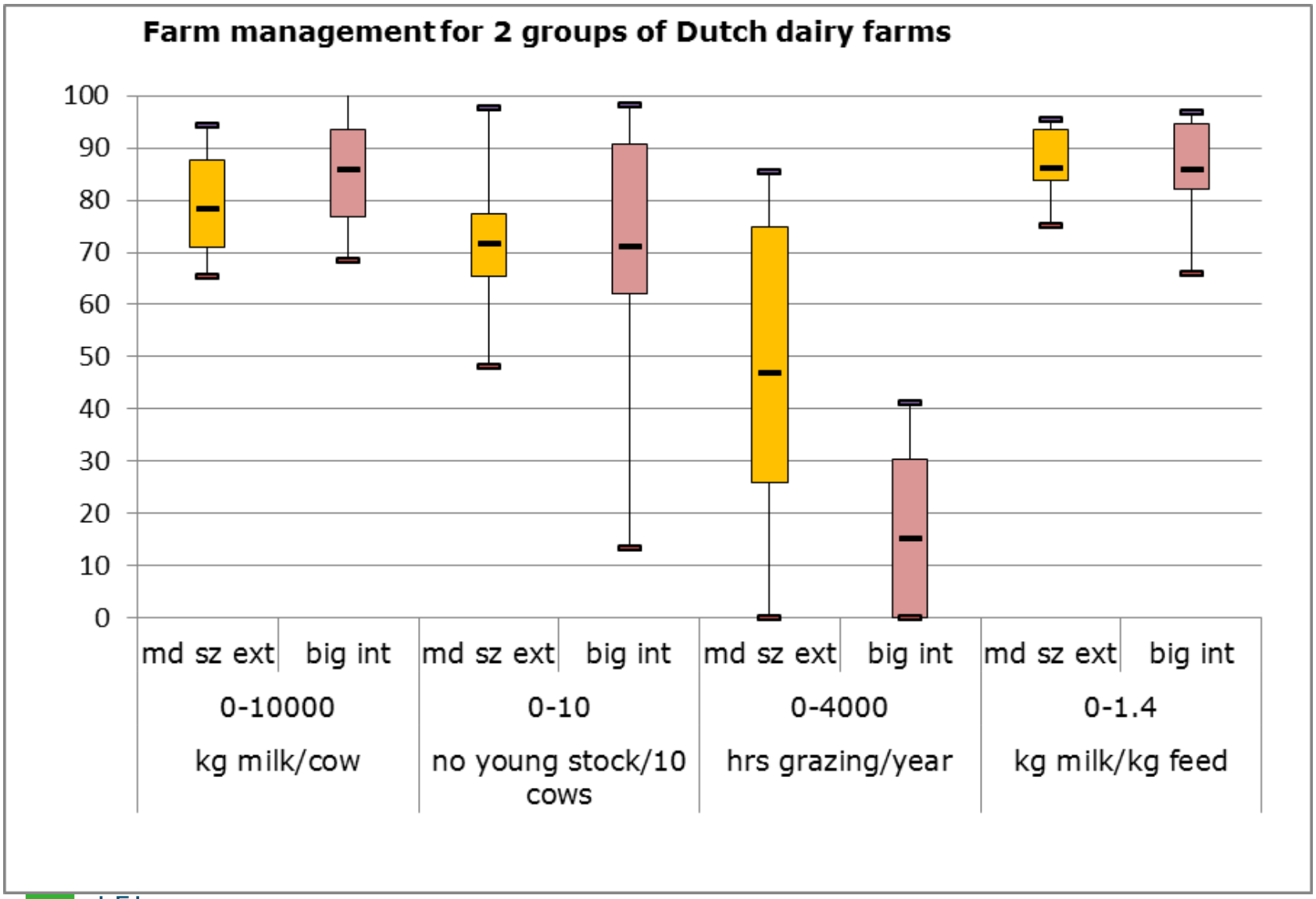
Farm structure of Dutch dairy farms



Farm management on Dutch dairy farms

	Dutch average	Medium size ex-tensive	Big intensive
Milk per cow (kg)	8000	8049	8845
Young stock/10 cows (no)	7.3	7.3	7.2
Grazing (hours/year by cows)	1333	1782	579
Feed efficiency (kg milk per kg feed)	1.23	1.24	1.24

Farm management on Dutch dairy farms



Sustainability on Dutch dairy farms: planet

	Dutch average	Medium size ex-tensive	Big intensive
% home grown feed in ration	60	68	49
Nitrogen soil surplus (kg/ha)	182	168	176
N-efficiency cattle	24	22	25
P-excretion (g/kg milk)	3.0	3.7	2.6
Energy usage (MJ/kg milk)	0.80	0.78	0.79
Carbon footprint (kg CO2/kg milk)	1.29	1.37	1.14

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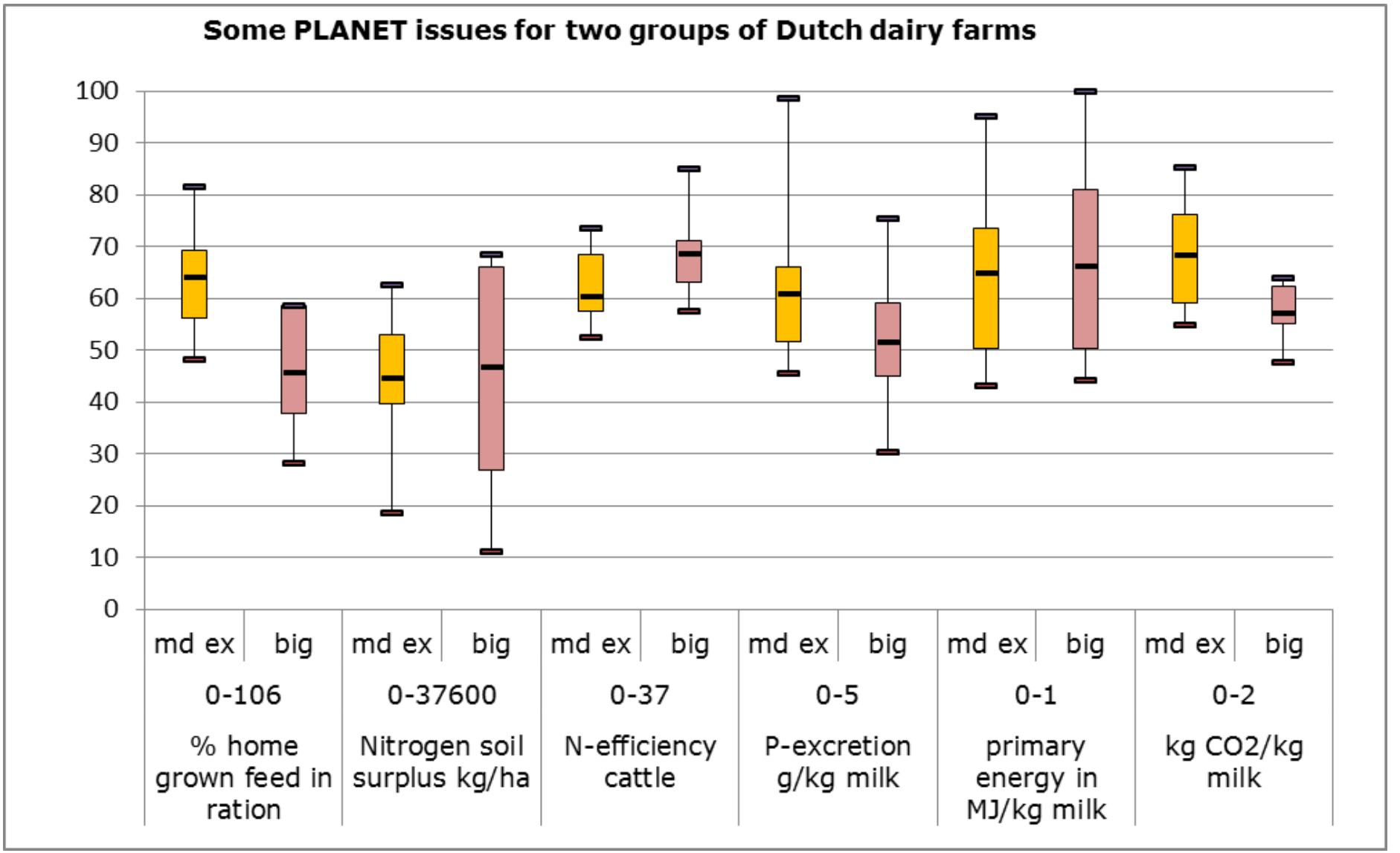
Sustainability on Dutch dairy farms: planet



Sustainability on Dutch dairy farms: people

	Dutch average	Medium size ex-tensive	Big intensive
Grazing (hours/year by cows)	1333	1782	579
Nature management (share of farms)	36%	57%	16%
Use of antibiotics (ADD)	2.9	2.7	3.5
Somatic cell count	199	217	208
Longevity (years)	5.6	5.7	5.2

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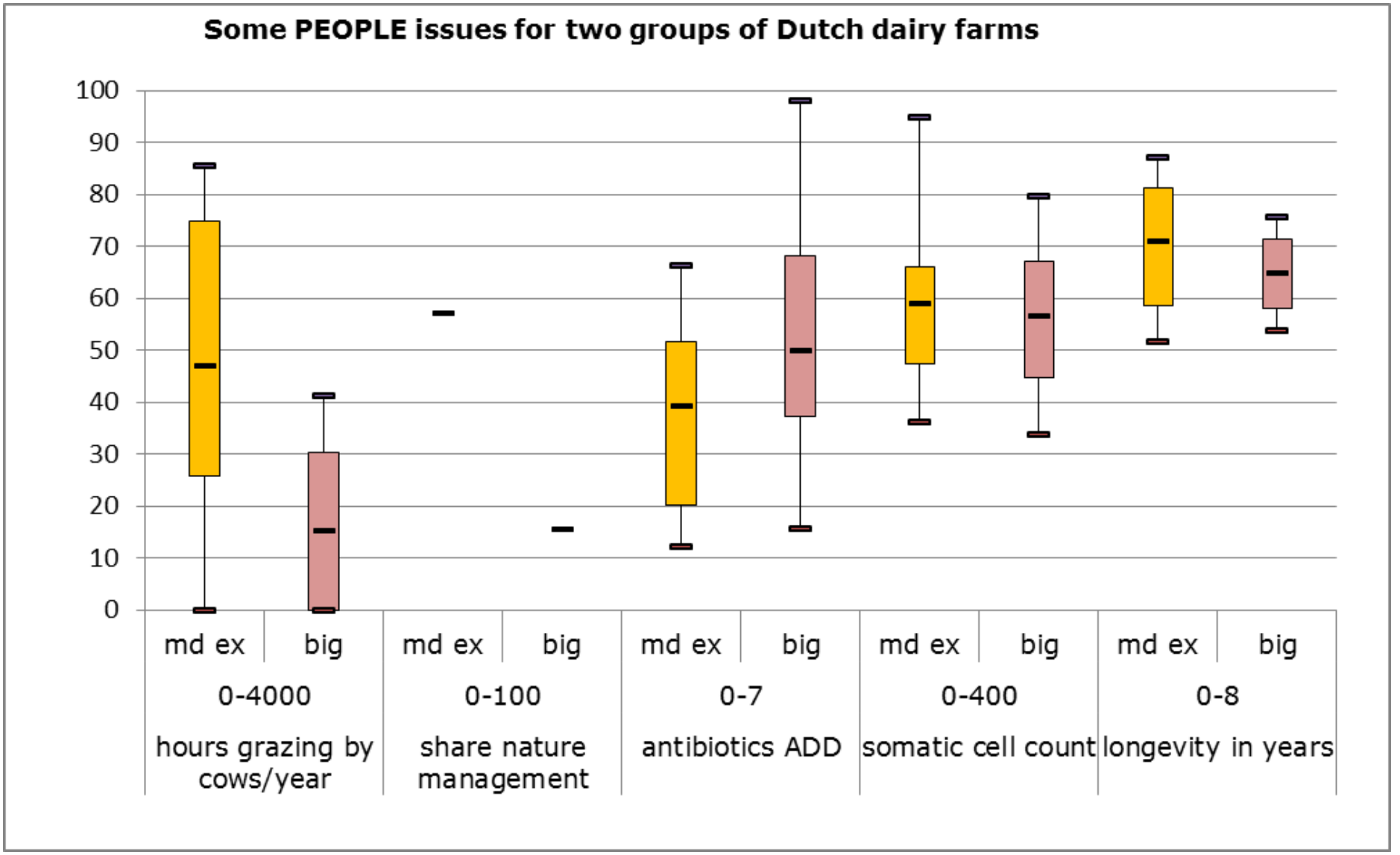
Sustainability on Dutch dairy farms: people



Sustainability on Dutch dairy farms: profit

	Dutch average	Medium size ex-tensive	Big intensive
Labour productivity (kg milk/hour)	206	172	295
Modernity	37	30	46
Farm income (€/unpaid labour unit)	47262	46235	58181
Long term debts (€/kg milk)	1.17	1.11	1.42
Cost price of milk (€/100 kg milk)	50.48	49.66	46.56
Paid costs (€/100 kg milk)	26.84	26.23	26.70

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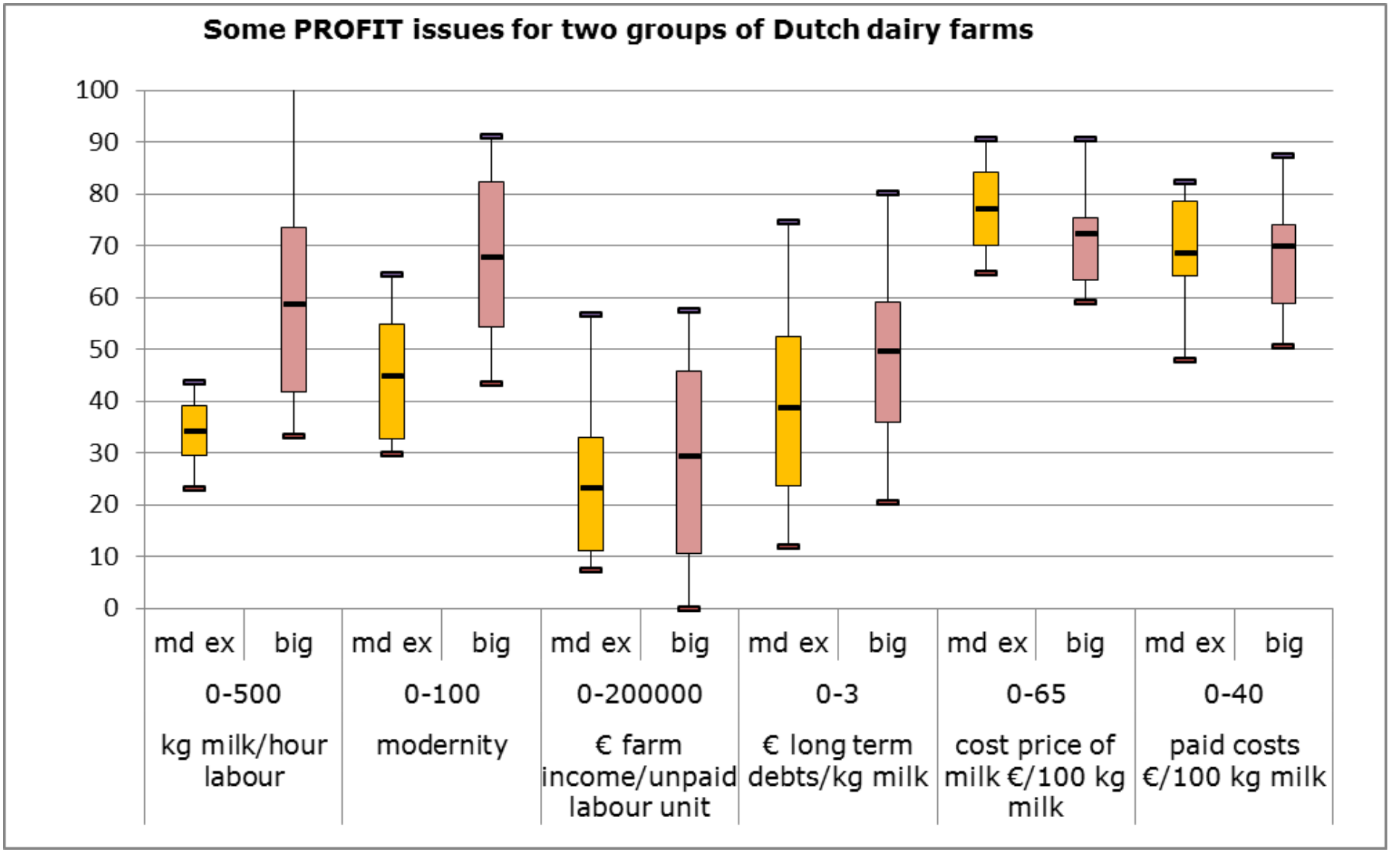
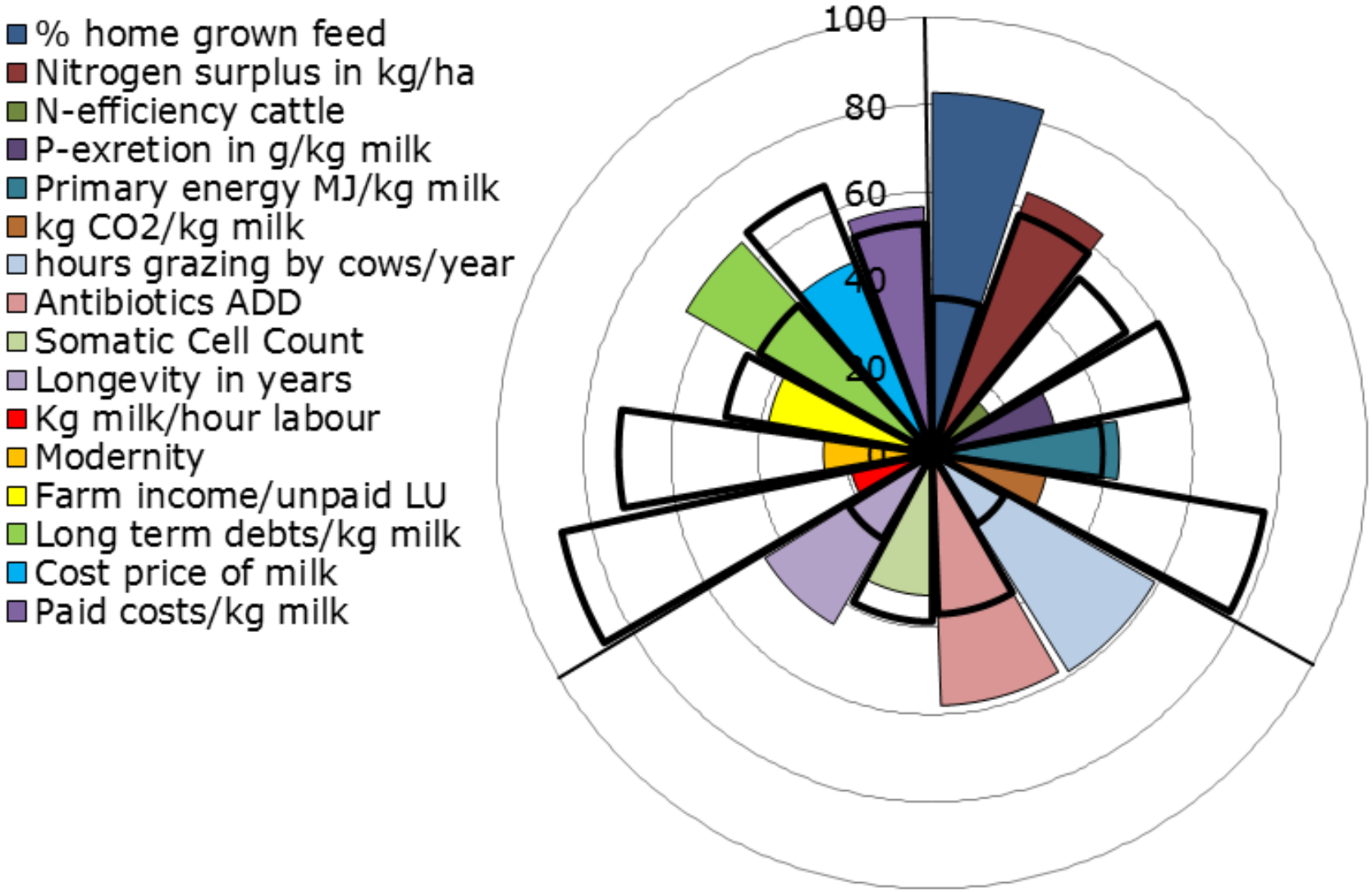
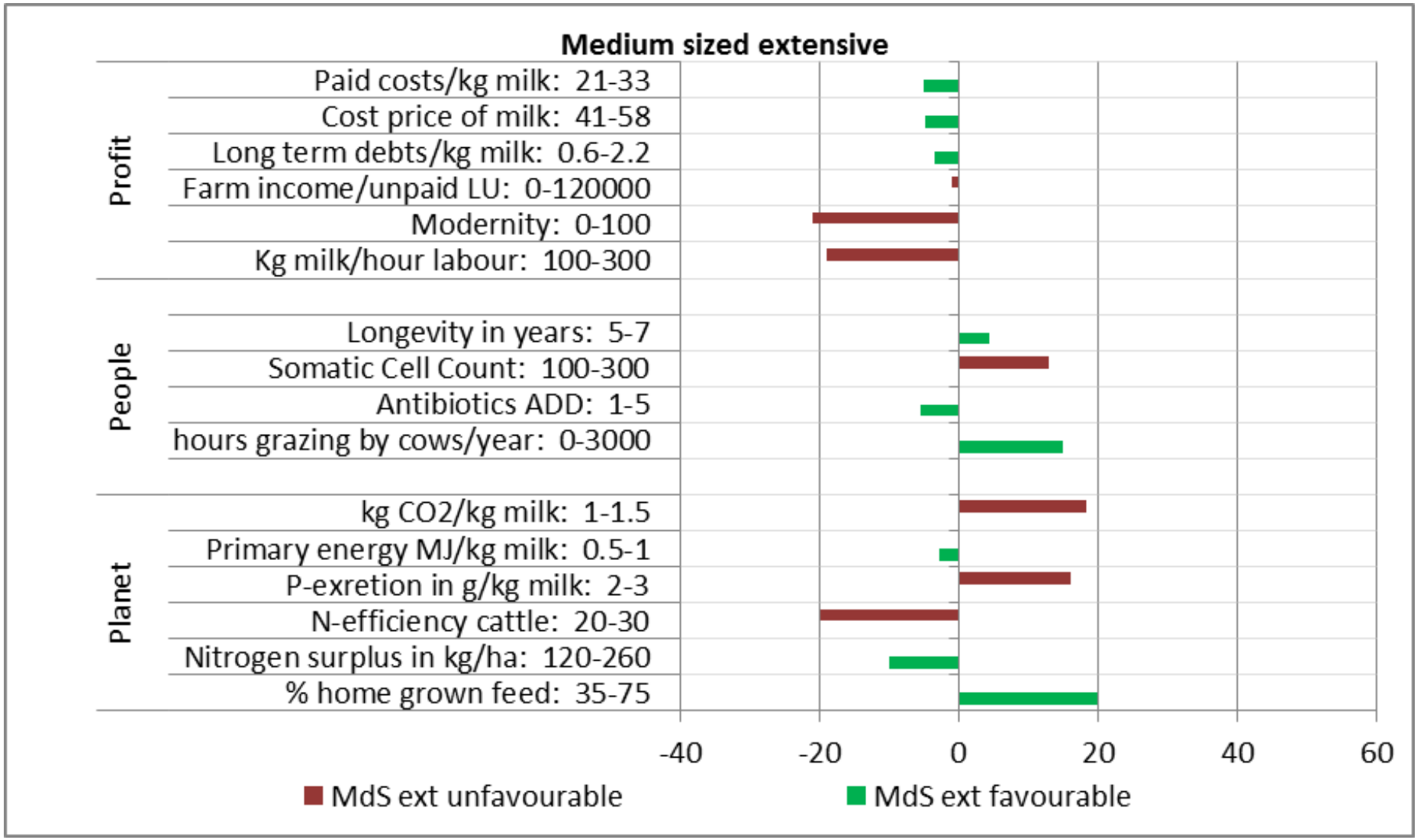
Sustainability on Dutch dairy farms: profit



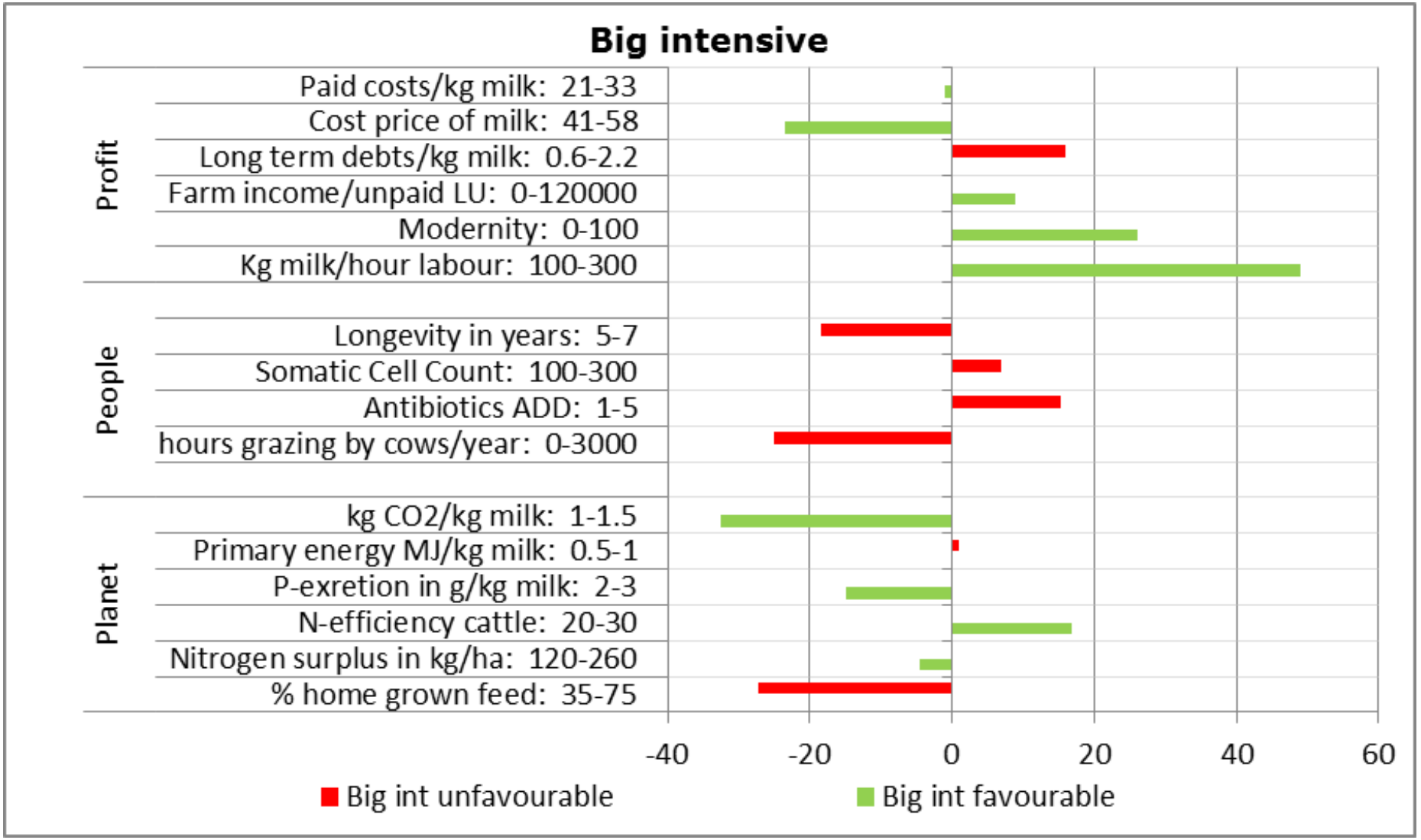
Two farm types: planet/people/profit



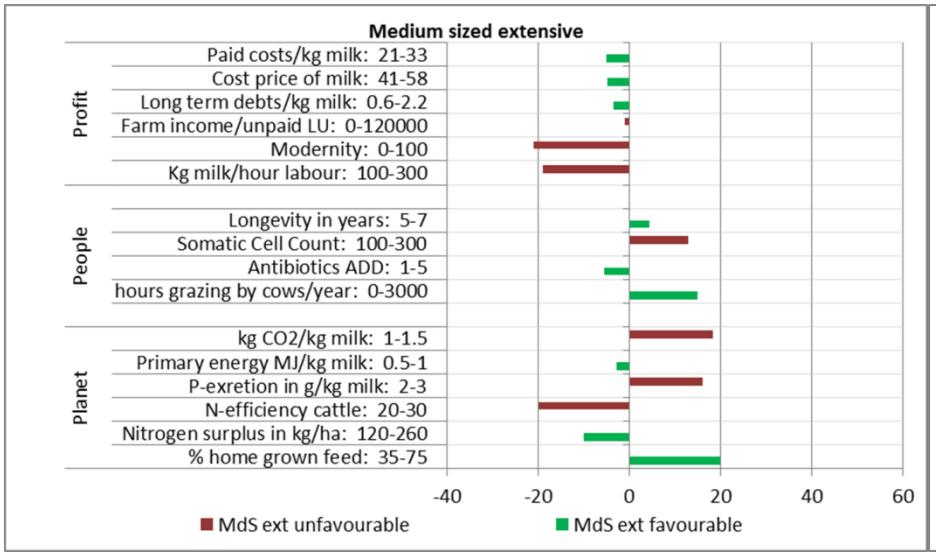
Med. sized extensive: planet/people/profit

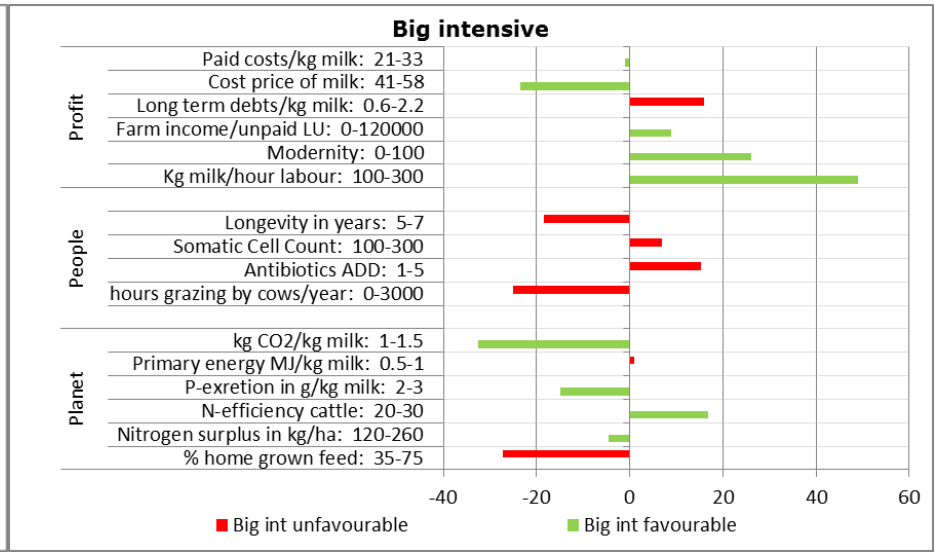


Big intensive: planet/people/profit

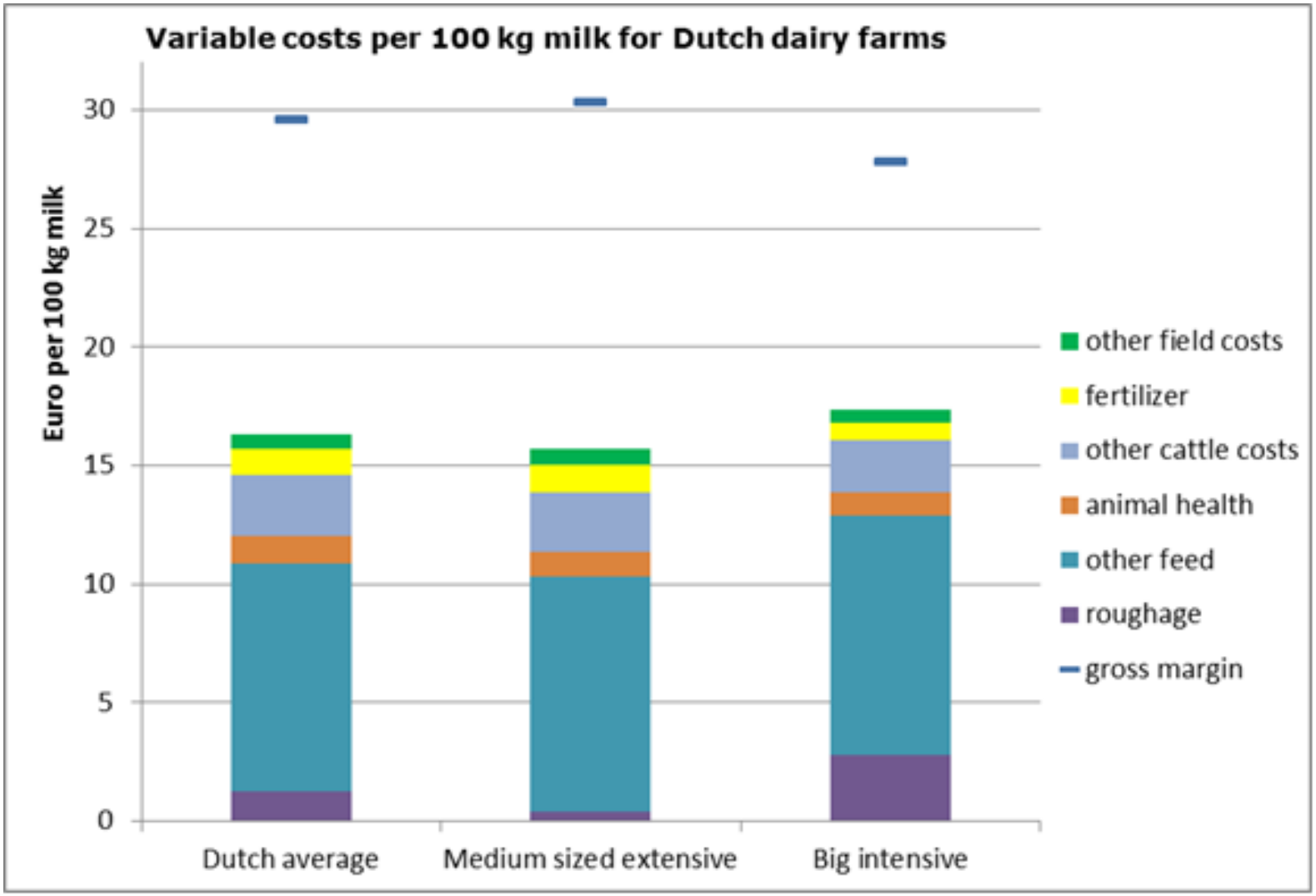


Two farm types: planet/people/profit

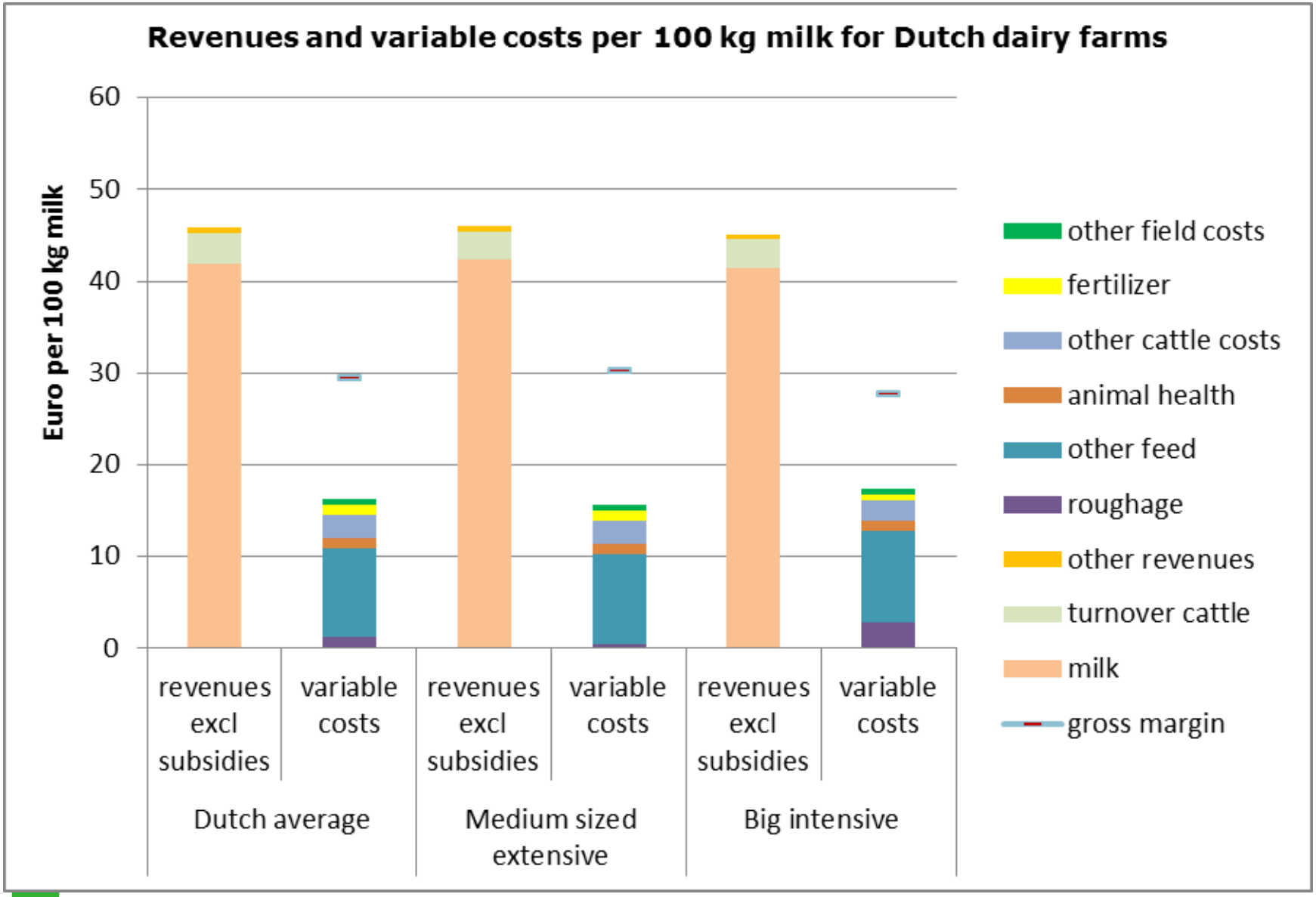




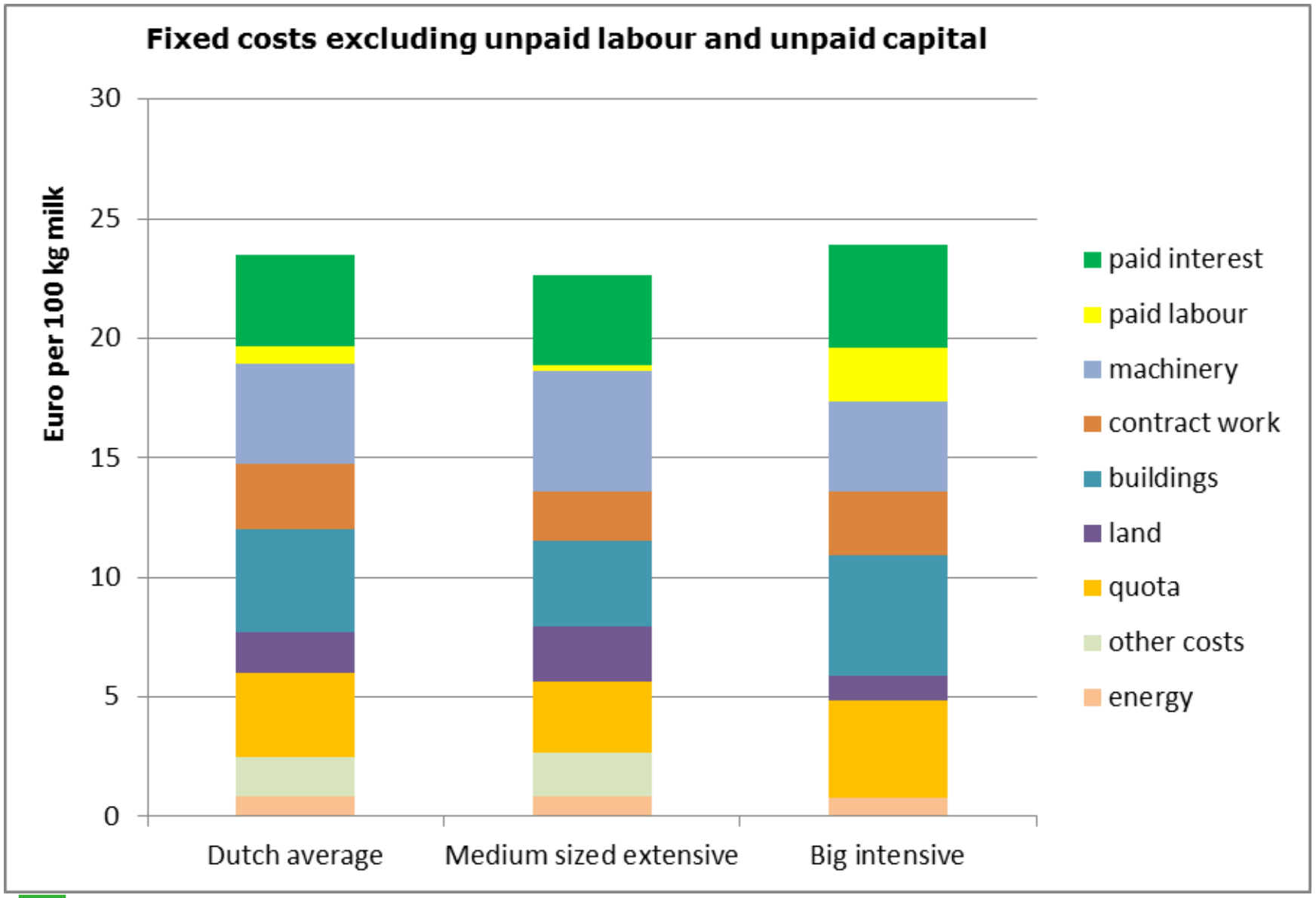
Variable costs and gross margin



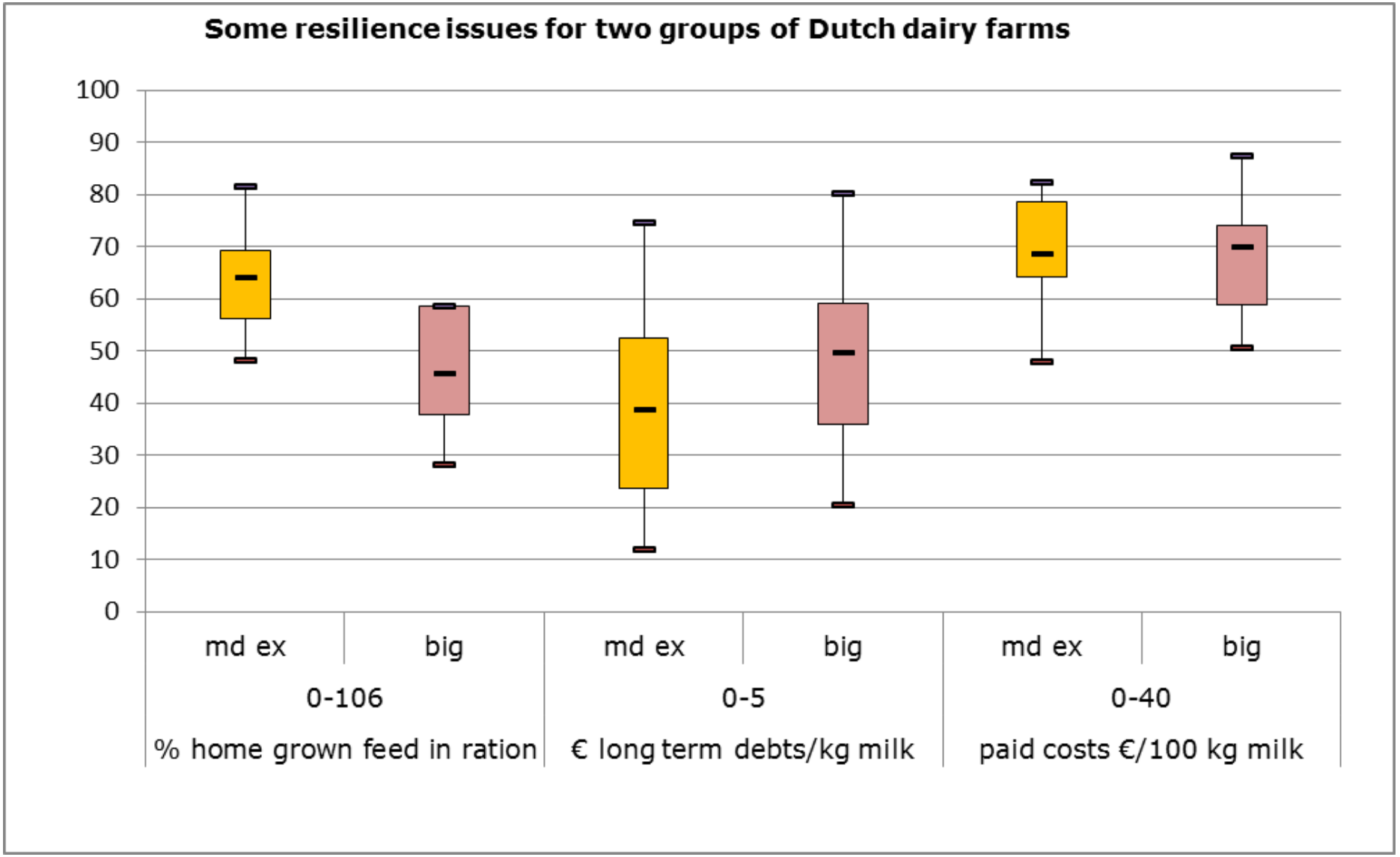
Revenues and variable costs



Fixed paid costs and depreciation



Resilience issues for two dairy farm types



Comparing two farming systems: Dutch Case

- Goal is to make similar comparison for Chinese situation
- What is the main objective:
  - Comparing systems within same region?
  - Comparing regions?
  - Assessing variation within a farming system to come up with a program for improvement?

Value of integrated and continous datacollection

- Dutch case based on Farm Accountancy Data Network (FADN)
- About 70 years old. Original purpose: base for the calculation of cost of production for the purpose of price policy
- LEI one of the founders of the FADN for the whole European Union (currently 28 countries).

Dutch Farm Accountancy Data Network

- Sample of 1500 agricultural and horticultural holdings
  - Representative for all "commercial" farms
  - Data available on individual level
- Yearly data of the 1500 farms
  - Financial: income, prices, balance sheet, costs, subsidies
  - Technical: kg/ha, milk production/cow, no of pigs
  - Environmental: nutrients/manure, energy/climate etc.
  - Animal health
  - Organic farming
  - Nature management
  - Non agricultural activities (Agro-tourism etc.)
  - Innovation, risk management, cooperation in the chain, etc.

Design principles of the FADN

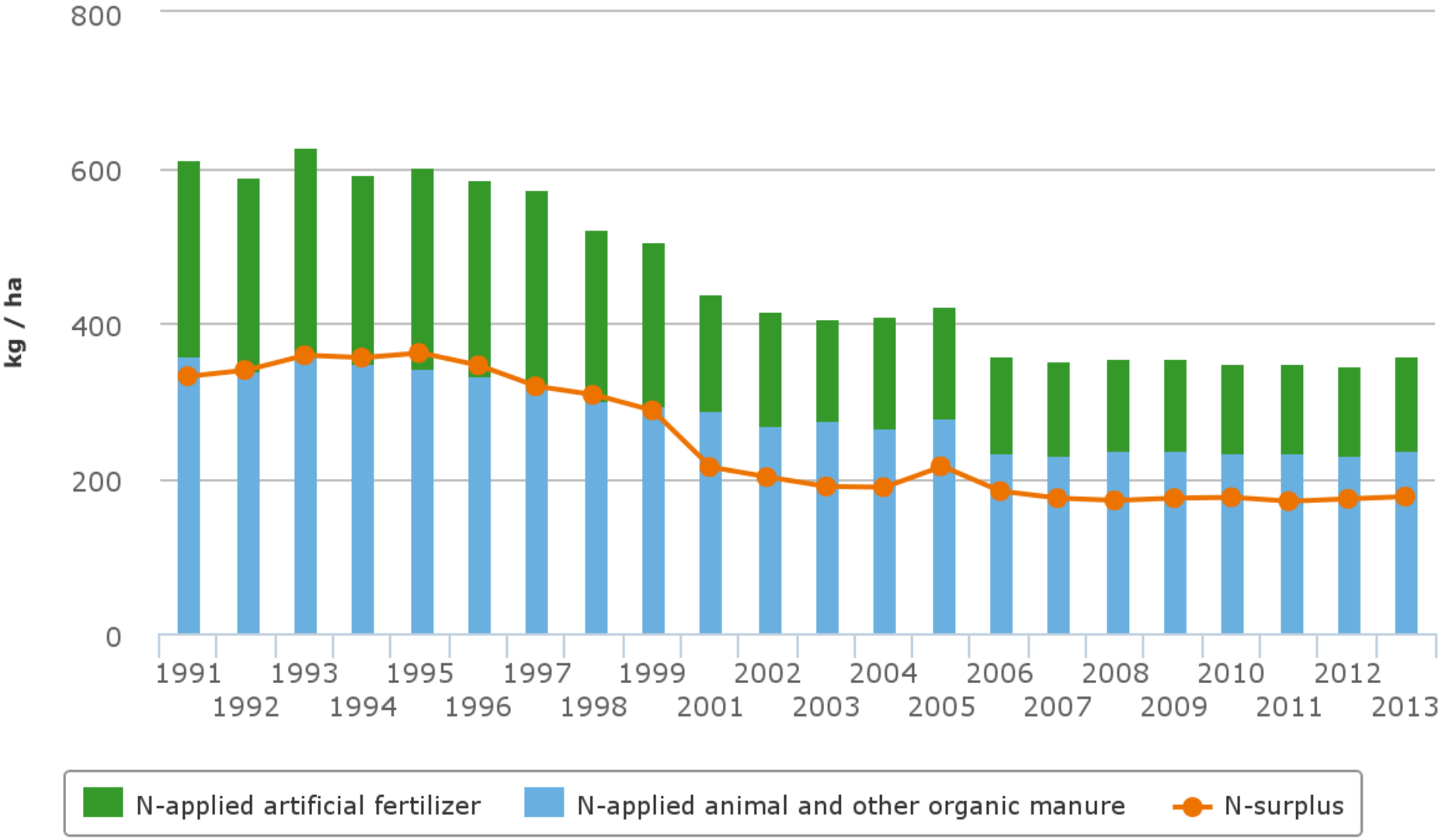
- No setup of data collection system for each policy objective but use same infrastructure to achieve synergy
  - Cheaper
  - Better quality
  - Reduction of administrative costs
  - Consistency
- Conditions for the system
  - Flexibility
  - Customer and future oriented

Value of integrated and continuous data collection

- Provides continuous monitoring on different indicators
- Can be used to estimate effect of changing circumstances e.g. different pricing, different policy etc.
- Can be used for comparing farming systems in an integrated way as in this presentation
- Can be used to provide individual farms with a benchmark

Nitrogen use and surplus

Dairy farms



Source: LEI Wageningen UR, Landelijk Meetnet effecten Mestbeleid

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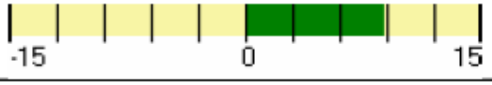
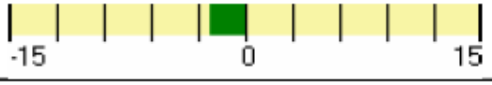
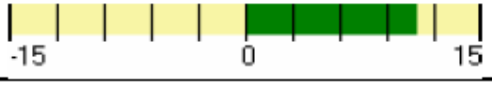
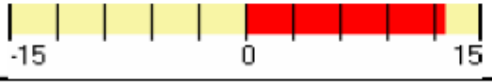
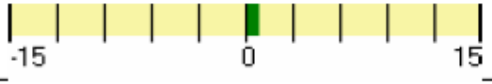
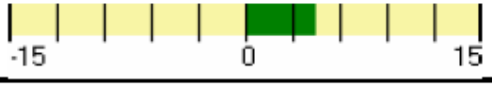
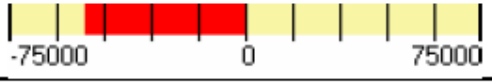
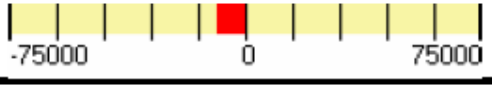
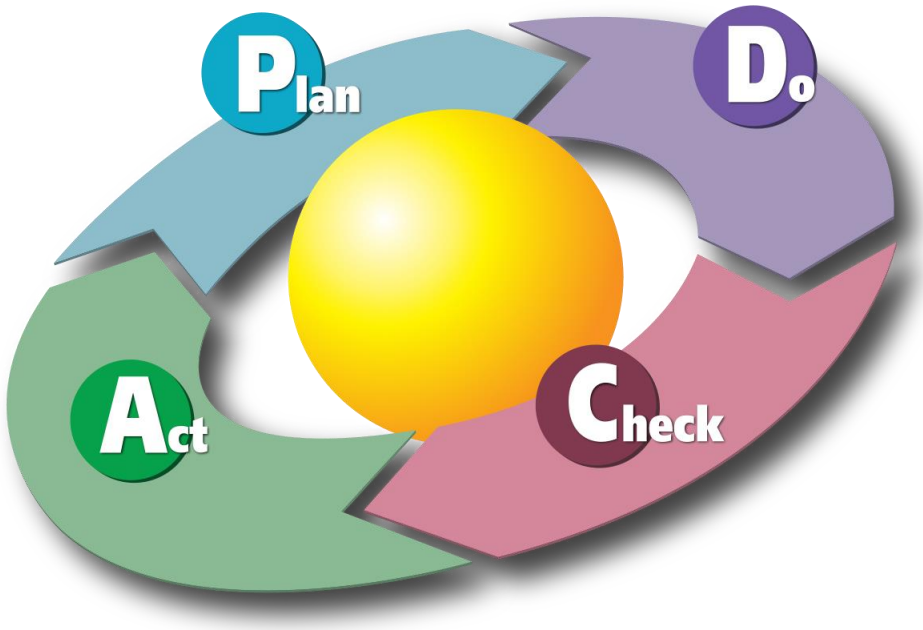
Benchmarking for individual farms

- Individual comparative report
- Important that performance of the farm is compared with the right peers

	Company X	Mirror group	Difference
Output	56.29	47.43	
Variable costs	8.87	11.1	
Gross margin	47.42	36.33	
Fixed costs	62.76	49.93	
Rate of return	79	78	
Labor income	14.63	10.02	
Milk production / man	193800	244098	
Turnover / man	109000	117480	

Benchmarking for individual farms

- Tool to assess strong and weak points
- Starting point of PDCA cycle: plan, do, check, adjust/act



Concluding remarks

- The presentation is based on the Dutch situation comparing two Dutch farming systems for performance indicators that fit with local circumstances.
- Differences within Dutch farming systems are (for many indicators) bigger than differences between farming systems.
- The choice for the 'best' farming system also depends on the choice of performance indicator(s), what are the key indicators for China?
- Beware not to just look at performance, but also at resilience or risk
- Differences in farming system are much bigger in China, how big will the differences be within a system?
- A benchmark is considered as an important tool to support management on a dairy farm, could this work in China and how should it look like (e.g. choice of peers)?

Thank you for your attention.

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