agri benchmark

Cash Crop Report 2009

Benchmarking
Farming Systems Worldwide

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Introduction

Water and water use are core future themes for agriculture. Soil and water resources cannot be multiplied and they assume a key position in agricultural production. Soil and water in an international context had been addressed as a central theme in the "World Soil and Water Show" at AGRITECHNICA 2009 (Hanover, Germany), one of the largest exhibitions of agricultural machinery.

The ***agri benchmark*** network was invited to present innovative farming strategies worldwide to counter water shortages in different regions. Approaches presented include, for instance, restructuring the crop rotations, converting tillage systems or developing improved irrigation methods.

Two concepts, addressing crop rotation and tillage systems, provided from our partner in Germany and Australia will be introduced in this chapter. The issue of improved irrigation systems as it is implemented in Nebraska for instance, has been part of Chapter 4.3.

Direct seeding – a pioneer in Germany

The 350 ha arable family farm of the Dümichen family (Figure 5.2.1) was converted completely to direct planting in 2008. For nine years before this the land was farmed with mulch planting, which is already common in the Eastern Germany region of Brandenburg. The natural and climatic conditions are challenging for arable farmers: 400 – 500 mm yearly precipitation in uneven distribution with distinctive pre-summer aridity. The soils are loamy sands with deep ground water level and soil quality is below average. Typical crops grown in the region are winter wheat, winter barley, rye, rapeseed and sugar beet.

Reasons and driving forces for the introduction of a new production system were the unfavourable natural conditions and their consequences: wind erosion, loss of humus, limited moisture retention capacities of the soils leading to yield limitations and increasing yield volatility. The farmer observed a deterioration of soil fertility. Furthermore the increasing input prices of the year 2007 turned the focus on a more cost effective production. One aim for the future of the Dümichen farm is, to run the farm with family labour only, which leads to labour extensive production systems.

Changing the production system

The changes in the productions system affect the tillage system in combination with an extension of the crop rotation. Instead of the usual conservation tillage with mulch planting, direct planting is applied for the whole farm. The crop is drilled in the standing pre-crop or in the stubble. The direct planting system is accompanied by intensive use of catch crops. They ensure a permanent shading of the ground and minimise evaporation. Furthermore, they suppress weeds and diseases. The catch crops sown are mustard, oats-pea-mix, clover, buckwheat, phacelia, oil radish. Besides the introduction of catch crops after each main crop, the crop rotation itself has been extended. The share of the main grains (winter wheat and winter barley) was reduced in favour of legumes and grass seed, especially on the less favorable fields (Figure 5.2.2).

Effects on labour and machinery costs

By comparison with the mulch planting previously practised some tendencies can already be observed, even though the new production system is implemented for the first year:

- only little cuts in yield
- machinery costs approximately 20 % lower
- tractor time reduced by approximately 40 %
- labour requirement approximately 30 % lower
- fertilizers, plant protection: savings potential during the conversion period (max 7 years)
- catch crop cultivation, costs per sowing operation approximately 40 – 60 USD/ha.

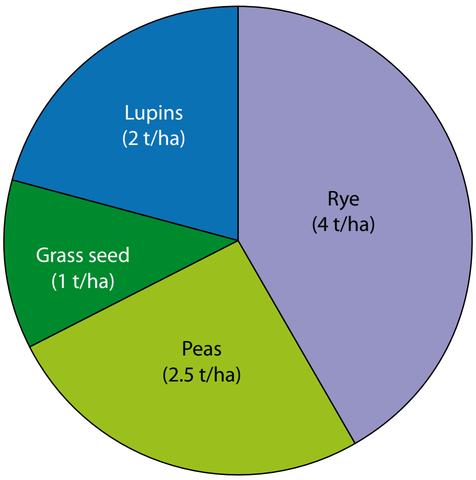
Long term soil recovery

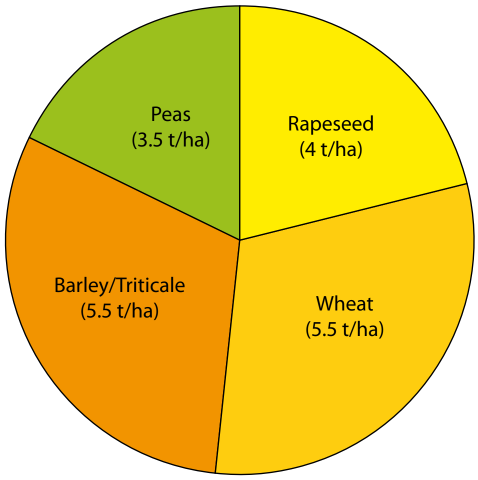
But not only the immediate economic effects are promising. Just as important are the long term soil recovery and the benefits for the soils structure improving the moisture retention capacity. The additional organic matter left on the field will lead to rising humus content.

Even though the overall conclusion is positive, there are still some remaining problems which need to be addressed during the next years. A reduction of glyphosate applications is envisaged and the problem of increasing vermin like field mice has not finally been solved.

5.2.1 Location of the German Dümichen Farm

5.2.2 New crop rotation on poor and better sites of the farm





Buckwheat as a catch crop

Australia: Increasing economic risk

Climate change and carbon storage are emerging issues that challenge farmer in Australia to cope with. The main challenges for a typical mixed farm are the growing uncertainty regarding yields coupled with seasonal feed shortages. The causes are an increase of drought periods, erosion, salinification, loss of humus and low moisture retention capacities of the soils. Furthermore an increase in herbicide resistances has been observed during the last years. The overall economic risk of farmers has increased leading to new – risk minimizing – farming concepts.

Pasture cropping

The mixed farm in New South Wales (see Figure 5.2.3) with sheep and cattle was converted to direct planting which is common praxis this region. Additionally, the combination of cropping and grazing into one land management method (pasture cropping) was introduced. Pasture cropping is a technique of sowing crops into living perennial (usually native) pastures and having these crops grow symbiotically with the existing pastures.

Pasture cropping principles

Depending on the annual precipitation, the crops are sown directly in to the natural grass vegetation. This ensures an all-year soil cover with active vegetation. Due to this strictly zero-till farming, the perennial grass vegetation is not been destroyed. Weeds can be controlled either by pasture management or by careful herbicide applications. But since pasture cropping is supposed to be a low-input strategy, a good pasture management with short grazing periods and high animal density per square meter is of major importance.

More flexibility

The decision which crops are going to be planted can be made shortly before sowing. Therefore short-term adaptation to weather and market fluctuations are possible. Crop planning is more flexible, from 90 % arable to up to 100 % pasture.

Further benefits are the higher water and nutrient efficiency and a minimized risk of soil erosion. By retaining perennial vegetation during the whole year, large increase in biomass can be achieved compared to conventional farming systems. Furthermore, rising soil carbon levels are expected in a long term perspective.

Economic effects

The experiences made on the farm during the last years shows, that pasture cropping is not only positive in terms of soil fertility and general improvements of the ecosystem. It has also the potential to be economically profitable.

Generally speaking, in average years only 60 % of the no-till gross margin contribution is achieved but there are other advantages: Due to the fact that the perennial pasture is kept, there is no need to re-sow pasture each year. The crop yields are lower, but good dry matter yields thanks to additional forage growth. Up to six months extra grazing is achieved with "Pasture Cropping" compared with the loss of grazing due to ground preparation and weed control required in traditional cropping methods.

Figure 5.2.4 shows a comparison between the conventional no-till system and the pasture cropping. Especially in the drought year 2006 the advantages of the pasture cropping became obvious. The gross margin contributions of the pasture cropping are still positive (20 USD/ha) while those farms with conventional no-till system face a minus of 200 USD/ha. However, in climatically favorable years the gross margin contributions in wheat are still higher in no-till systems. Therefore pasture cropping can be seen as long-term strategy of adaptation to climate change and aims to avoid risk.

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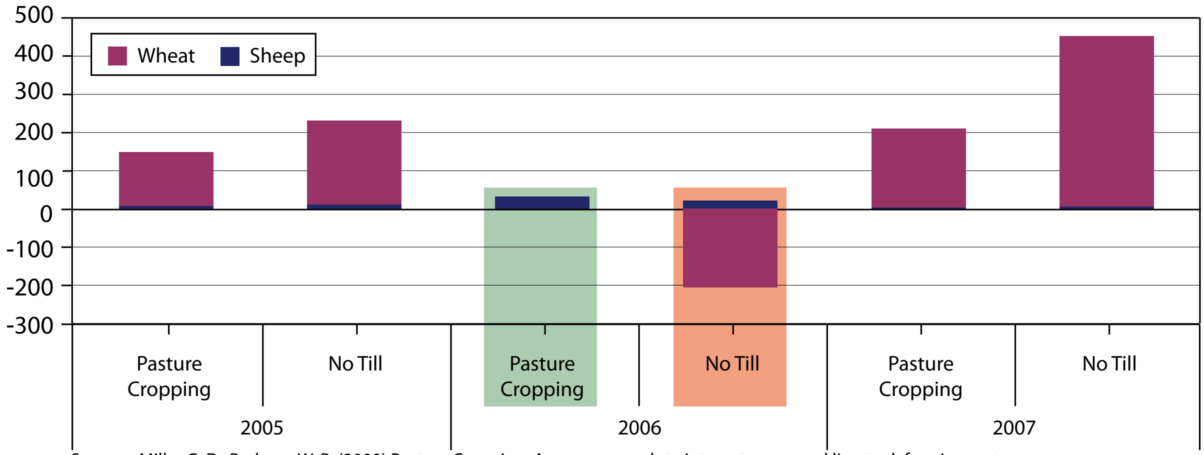
5.2.3 Location of the pasture cropping farm

5.2.4 Gross Margins Pasture cropping and no-till (USD/ha)



Source: Millar G. D., Badgery W. B. (2009) Pasture Cropping: A new approach to integrate crop and livestock farming systems. Animal Production Science 49, 777-787.

A.6 Abbreviations

Countries

AR	Argentina
AU	Australia
BG	Bulgaria
BR	Brazil
CA	Canada
CN	China
CZ	Czech Republic
DE	Germany
DK	Denmark
FR	France
HU	Hungary
IT	Italy
KA	Kazakhstan
MY	Malaysia
PL	Poland
RO	Romania
RU	Russia
SE	Sweden
UA	Ukraine
UK	United Kingdom
US	United States of America
ZA	South Africa

Measures and Units

h	Hour
ha	Hectare
hl	Hectoliter
kg	Kilogram(s)
t	Metric ton

Others

AN	Ammonium nitrate
CBOT	Chicago Board of Trade
Defra	Department for Environment, Food and Rural Affairs
EBA	Everything but arms; EU initiative to promote market access for least developed countries
EU	European Union
FAO	Food and Agriculture Organization
GDP	Gross domestic product
GEMIS	Publicly available database for the calculation of GHG emissions (see: *http://www.oeko.de/service/gemis/de/index.htm*)
GHG	Greenhouse Gas
HGCA	Official British body to promote production and marketing of grains and oilseeds
IGC	International Grains Council
IPPC	Intergovernmental Panel on climate change
Liffe	Electronic trading system for future markets in commodities (see: *http://www.liffe-commodities.com*)
MATIF	MATIF - Marché A Terme d'Instruments Financiers,Paris; France Exchange for futures in agricultural commodities
NA	North America
ONCCA	National Office for the Agricultural Commerce Control
SH	Southern Hemisphere
UCAB	Ukrainian Agribusiness Club