

# FOCUS ON MINIMUM TILLAGE, CROP ROTATION AND RESIDUE MANAGEMENT

**Name** Bjarne Hansen  
**Region** Sjælland, Denmark  
**Farm type** Mixed (Clover/grass seed and cereals)  
**Farm size** 279ha



## How long have you been farming?

I have been farming for 51 years and took over Kruusesminde Farm in 1995. The farm is 279ha but only 203ha are cultivated. The farm receives 150 mm less rainfall compared to the surrounding areas which has consequences for the timing of the farming operations and choice of crops to be grown.

## What changes have you made?

The combined minimum-till, crop rotation and residue incorporation was applied to the whole farm since I took it over. I know that crop residues are rich in macro and micro nutrients and so residue retention and incorporation into the soil retained the essential nutrients to maintain the soil fertility.



## Why did you decide to implement the practice(s)?

At the start, 20 years back, the soil was very difficult to plough due to high content of silt. Since then I have practiced minimum tillage. Residue was incorporated into the soil to improve the soil structure.

## How have you incorporated minimum tillage and residue management into your rotations?

I practice a combination of minimum-till, residue retention and crop rotation in each field. I practice two 6-year crop rotations on, firstly, 4-year spring barley with under-sown grass-spring barley – winter wheat and secondly, spring barley – clover – 2 year grass – spring barley – winter wheat.

## What has been the biggest challenge? And how have you overcome it?

Weed pressure is one of the issues so I use round-up to eliminate the weeds well before the sowing period. The timing of the herbicides can have significant effects on the weed pressure during the crop growing cycle.

### How has the soil benefited from this change?

There is better soil structure, more soil organic matter and enhanced germination of grass and clover seeds, retention of phosphorus on-farm in the crop residues, better precipitation infiltration and higher number of earthworms and microbial activity. Growth of soil mycorrhizae is also enhanced, reducing the pest and disease incidence and need for chemical spray. Soil samples were taken from 6 different fields in the farm and soil quality index has indicated good soil structure with high soil organic carbon content and water holding capacity.

#### Estimated impact on soil carbon (tC/ha/yr)

Crop Rotation	0,23
No tillage	0,28
Residue management	0,62
<b>Total</b>	<b>1,13</b>

### How have the yields been affected by this change?

There have been equivalent or higher yields compared to the neighbours not practising the measures. I am very satisfied with the yield level on the farm. Due to better nutrient uptake resulting in equivalent or higher yields compared to the conventional practice, even though the area receives less rainfall compared to the average.

### How has the farm business benefited from this change? What are the financial implications of making the change?

The cost saving is significant if the whole cultivated area is taken into account. I spend 500 dkk per hectare less than other farmers in the vicinity. Savings are from the reduced machinery investments, less fuel and reduced nitrogen fertilizer input. The fuel cost saving was very evident because of reduced number of hours required for machinery use. Less nitrogen fertilizer is required due to higher nutrient use efficiency in the fields where the measure is applied.

For further information about these practices see the SmartSOIL toolbox:

<http://smartsoil.eu/smartsoil-toolbox/about/>

### Where did you get advice and support to make the change?

I was inspired to practice minimum-till from an apprenticeship as a farm helper in Canada, where I had the opportunity to learn about it and see the benefits of minimum tillage. I also get good support from the advisory service.

### What advice would you give to others thinking about the change

I did not have any major issues regarding the implementation of the measures, but as a cautionary note, you need to use 10% more seed to ensure uniform and even germination and maintain the plant population for good yields. Also, you need to use herbicides at the right timing to eliminate weeds well before the crop growth cycle.

#### Farm-specific economic analysis for the combined measures (in DKK/ha)

Costs savings: 1534 DKK/ha (-36%)

	With measure	Without measure	Result
Seed costs	486	462	+24
Fertiliser costs	1665	2176	-511
Crop protection	382	577	-195
Fuel costs	149	1001	-852
<b>Total</b>	<b>2682</b>	<b>4216</b>	<b>1534</b>

Change in Gross margin: 2687 DKK/ha

	With measure	Without measure
Output (Revenue)	10064	8910
Costs (Production)	2683	4216
<b>Gross margin</b>	<b>7381</b>	<b>4694</b>

