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JAPANESE-DANISH DAIRY FARMING COLLABORATION
IN THE PRESENTATION

- Weather conditions in Denmark.
- National Field Trials.
- Utilization of the animal wastes Denmark.
- Production of roughage and quality feed.
- Grassland management.
  - The recommended mixtures for different growing conditions.
  - WEB tools for optimizing quality and yield.
- Cultivation of maize.
  - WEB Tool for Choice of varieties and harvest date.
FIELD TRIALS

IN DENMARK MORE THAN

1,000 FIELD TRIALS PER YEAR
FIELD TRIALS WITH GRASS SPECIES AND VARITIES

Tall Fescue

Festulolium

Perennial Ryegrass
SLURRY TRIALS - EFFICIENCY & EMISSIONS
NATIONAL FIELD TRIALS

- App. 1,000 on-farm trials are carried out per year all over the country. They are designated “Landsforsøg®” = National Field Trials.
- Tested on different soils and water regimes
- Many repetitions for better results.
- Map of field trials Landsforsøg
Data Collection
DATA COLLECTION BASED ON WEB

Advantages:

- Data is transferred directly into the system
- Saves time
- Avoids Transmission error
- Enables fast data exchange
NORDIC FIELD TRIAL SYSTEM – DATA MANAGEMENT VIA THE INTERNET

- Hand terminal
- Local PC
- Central database

Data tables
Registrations
PC field trial
Registrations
Results
RESULTS PUBLISHED APPR. DEC. 20TH
PRODUCING NEW KNOWLEDGE

- National Field Trials
- FarmTest of machinery and technologies
- Interaction and co-operation with researchers.
WHY ON-FARM FIELD TRIALS?

- Pesticides, varieties, fertilizers, strategies etc. are tested in "real life"
- They generate results that are directly distributed to the advisers and farmers – and immediately implemented by the farmers
- They provide "the link" between researchers and the farmers.
FIELD TRIALS – RESULTS AND REPORTING

• Single trial results are published on the internet (updated within minutes after data reception)
• Results from variety trials are presented in SortInfo
• Series results are published when all single trial results have been validated
• The annual report is published every year in December
MORE FOR LESS – DANISH AGRICULTURAL PRODUCTION INCREASES WHILE THE ENVIRONMENTAL IMPACT DECREASES

BROAD SPREADING
INJECTION IN BLACK SOIL AND GRASS LAND
UTILIZATION OF N IN ANIMAL MANURE
SURPLUS OF NITROGEN FOR DANISH AGRICULTURE
Nitrogen efficiency in Danish Agriculture

Increase 0.62 pct. per year

$R^2 = 0.83$
USE OF NITROGEN IN DANISH AGRICULTURE

Ton nitrogen

Mineral fertilizer

Animal manure

1985 1987 1989 1991 1993 1995 1997 1999 2001 2003 2005 2007 2009 2011 2013
Slurry tank in concrete with plastic cover

UTILIZATION OF SLURRY AND MANURE

1. Storage of slurry and manure until usage (6-9 months)
2. Avoid leaching and evaporation; cover and solid base
3. Use the best technologies
4. Apply only when the crops need the nutrients
5. Apply no more than needed; 30-50 tonnes per hectare
6. Use applying equipment which applies even on the field
FROM WASTE TO VALUE
QUALITY FEED – QUALITY FOOD – HIGH PRODUCTION – HIGH PROFIT

Grass

Maize
HOW IMPORTANT IS QUALITY FEED?

Kg ECM and kg dry matter per day

Digestibility organic matter (%) – roughage

Feed intake
Output of milk

Thøgersen & Aaes, SEGES Dairy and beef research centre
TARGETS FOR THE ROUGHAGE PRODUCTION

● Three important targets are:
  ● Big rate of self-sufficiency of good quality roughage
  ● High yield of energy and protein per hectare
  ● High digestibility of organic matter in the feed-ration
GRASSLAND MANAGEMENT
GRASS LAND I DENMARK

- Growing clover grass mixtures in rotation
  - Grazing regime, 3-5 years utilization before ploughing
  - Cutting regime, 2-3 years utilization before ploughing

- Grazing
  - Conventional farms < 20 percent is grazing
  - 10 percent organic milk production – grazing on all farms
MOWING, STUBBLE HEIGHT 6-7 CM,
SPREAD ALL OVER THE FIELD
Gathering at about 30 percent dry matter
CLOVER GRASS FOR CUTTING

- 10-14 ton DM per ha
- 4-5 cut (every 30-40 days)
- Target:
  - 33-37 percent DM
  - Digestibility of organic matter 78 percent
  - Min. 160 gram protein per kg dry matter
THE RECOMMENDED SEED MIXTURES AND THE COMMITTEE

- It is very important that we have recommended mixtures for the various cultivation and climate conditions.
  - The recommended seed mixtures in Denmark cover 70-80 percent of the total sale.
  - Usually one committee meeting is held every year.
  - Adjustments of the mixtures when needed.
  - Usually there is one major readjustment every 4 years.
THE MOST COMMON SPECIES IN MIXTURES

- **For cutting:**
  - Perennial Ryegrass (lolium perenne), Festulolium, Red Clover and White Clover

- **For grazing:**
  - Perennial Ryegrass and White Clover
PRIMARY SPECIES TO NORMAL AND GOOD CONDITIONS

- Perennial Ryegrass (Lolium perenne):
  - Good yield, long season growth, very good quality, but less good persistence
  - Suitable for grazing or cutting leys
  - Responds well to nitrogen
PRIMARY SPECIES TO PERMANENT AND COOL CONDITIONS

- **Tall Fescue** (*Festuca arundinacea*):
  - Good yield, very drought-resistant (deep roots), very winter-hardy and have a very good persistence
- **Timothy** (*Phleum pratense*):
  - Tolerant of wet and cool conditions
  - Compatible with white clover and useful in low-input systems
- **Meadow Fescue** (*Festuca pratensis*):
  - Compatible with white clover and useful in low-input systems
- **Cocksfoot** (*Dactylis glomerata*):
  - Withstands dry conditions
- **Red Fescue** (*Festuca rubra*):
  - Good ground cover
FIELD TRIALS WITH GRASS SPECIES

Perennial Ryegrass

Tall Fescue

Festulolium
CLOVER (LEGUMES) ARE VERY IMPORTANT

- Leguminous plants fix atmospheric nitrogen through rhizobia bacteria in root nodules
- Roughly speaking, 30-40% clover in a sward has the potential of supplying 100-200 kg nitrogen per hectare, red clover the most.

The most common species in mixtures are
- **White Clover (Trifolium repens):**
  - Contributes to grazing and cutting
  - Most common legume sown in grazing mixes
- **Red Clover (Trifolium pratense):**
  - Upright habit, more suitable for cutting swards
  - Deep tap root offers dry season tolerance
  - Last 2-3 years
WEB TOOLS FOR OPTIMIZING QUALITY AND YIELD
CONSERVING GRASSLAND FORAGES

- Farmers enter
  - zip code (for local climate data) and mixtures
- Farmers get
  - Prognosis for harvest date and quality

Yield, kg dry matter per ha

Energy MJ/kg dry matter
WEB TOOLS FOR OPTIMIZING DRY MATTER CONTENT

- Farmers enter
  - zip code (for local climate data) and grass mixture

- Farmers get
  - Prognosis for dry matter content after mowing
WEB TOOLS FOR OPTIMIZING GRAZING MANAGEMENT

- Farmers enter
  - zip code (for local climate data) and grass mixture

- Farmers get
  - Prognosis for
    - Daily grass production
    - Energy
    - Protein
    - Sugar
SILAGE MAIZE

- 10-16 ton dry matter per ha
- 32 % DM in the whole plant
- 78 percent digestible organic matter
- 65 percent digestible fiber
Ontario heat units 15. April – 15. October, 10 year average

4 weeks later maturity in cold than in warm regions
WEB TOOL FOR ELECTION OF VARIETIES

- Farmers enter
  - zip code (for local climate data)
  - Date of planting
  - Date of harvest
  - Target of dry matter content in silage

- Farmers get
  - probability of maturity
  - Trial results from his region
WEB TOOL FOR MATURITY DATE

- Farmers enter
  - zip code (for local climate data)
  - Variety
  - Date of planting

- Farmers get
  - Prognosis for maturity date
DANISH ON-LINE FIELD DATABASE

- Tabular and spatial data
  - Field polygons
  - Crop, variety
  - Cultivation
  - Seeding
  - Fertilizing
  - Crop protection
  - Harvest and yield info.
  - Animal husbandry
    - Number, weight, housing type, prod. information etc.
- 26,000 farms
- 2.1+ mio. ha (80-85% of total arable land)
Example, the island of Mors, 2014
FARMTRACKING

- Farmer’s personal and mobile registration tool
- Two versions
  - FarmTracking Free (Free)
  - FarmTracking Basic (from 695 DKK)
- Apps: Android og iOS
GRASS LAND MANAGEMENT