# HOW TO SUCCEED IN MANURE SAMPLING AND ANALYSIS?

## MANURE STANDARDS PROJECT RECOMMENDATIONS FOR MANURE SAMPLING AND ANALYSIS

*All material available at www.luke.fi/manurestandards/en*

Manure Standards recommendations

Interreg Baltic Sea Region

EUROPEAN REGIONAL DEVELOPMENT FUND

EUROPEAN UNION

EU STRATEGY FOR THE BALTIC SEA REGION FLAGSHIP

# MANURE SAMPLING

**To make a good fertilisation plan, reliable information on manure nutrient content is needed.**

As manure is heterogeneous, an appropriate sampling method is crucial for obtaining a representative sample for manure analysis.

The accuracy of manure analysis is only as good as the sample sent to the laboratory! As sampling is time-consuming, a balance must be struck between sampling accuracy and the labour required. In general, the larger the storage, the more subsamples should be taken.

Manure sample can be collected either from storage or from several loads during spreading. The latter often gives good accuracy but will not supply data for adjusting immediate fertilizer doses. The results, however, may be used for calculating additional mineral fertilizer quantities.

## Solid or semi-solid manure (non-pumpable)

Suitable instruments for solid manure sampling include e.g. a pitchfork or a solid manure auger. If sampling is done with an auger, a suitable sampling depth is approximately 1 meter.

At least 5 subsamples from different locations of the manure pile should be taken and mixed together to achieve a representative sample of approximately 1 litre for analysis. Subsamples should be taken at different places and depth, not only from the outer layer of the manure pile.

## Slurry or urine (pumpable)

Slurry and urine should be thoroughly mixed before sampling. To ensure a representative sample, especially in case of difficulties with mixing, the subsamples should preferably be taken at different levels: top, middle and bottom layer.

Approximately 2-8 subsamples should be taken and mixed together, and a sample of about 1 litre should be taken from the mixture for analysis.


The sample should be sealed immediately and placed in a cooler to ensure a temperature between 1 and 5 Celsius degrees until quick delivery to the laboratory for analysis. The sample may also be frozen.

Photos: Åsa Myrbeck

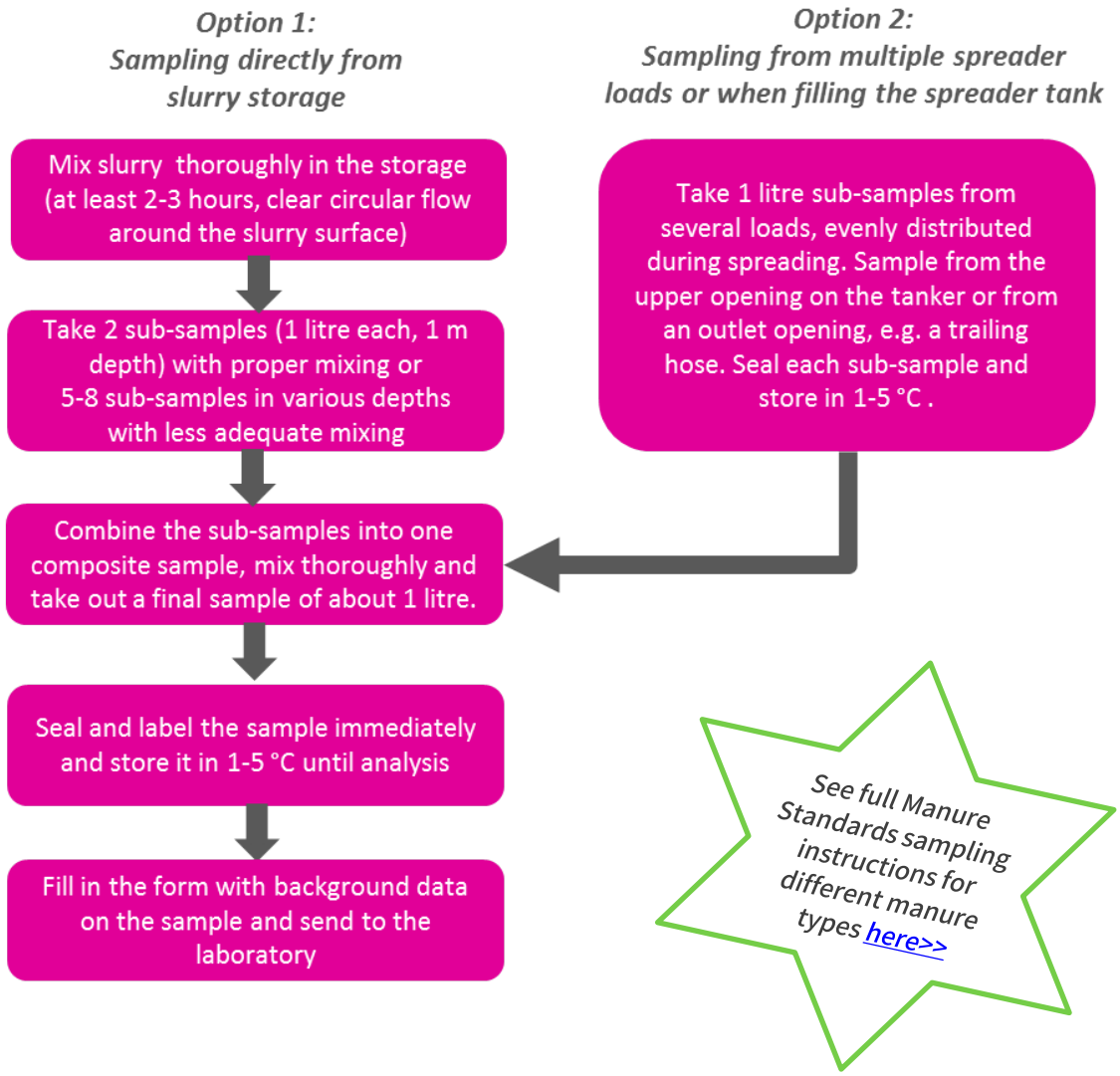
# MANURE SAMPLING

## Slurry, liquid manure or urine

Slurry and its nutrients are stratified to different layers when not mixed. The degree and pattern of distribution vary between different nutrients. Particularly phosphorus (P) tends to be high in the top and bottom layer with the organic matter. For this reason, it is very important slurry is well mixed before sampling. When the slurry is well-mixed, fewer subsamples are needed.

### Equipment needed:

- ✓ A bucket or, if available, a subsurface slurry sampler that allows collection of a sample from a specific depth below the surface.
- ✓ A bucket and a small spade (or other) for mixing subsamples into a composite sample.
- ✓ Labelled sample containers of approximately 1 litre.
- ✓ Rubber gloves and other personal protection equipment.
- ✓ A cooler with ice or other equipment able to ensure 1-5 °C sample temperature.



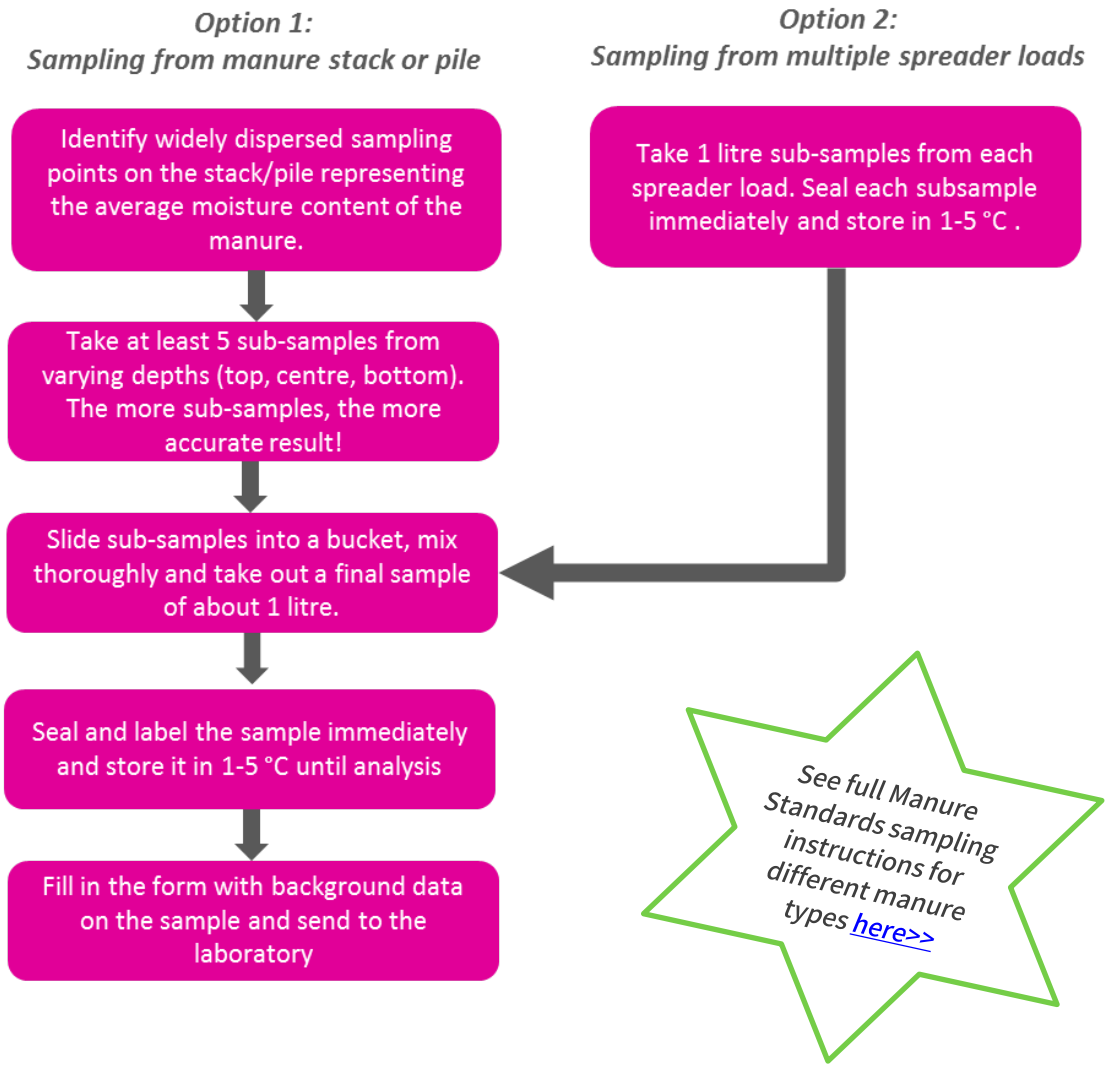
# MANURE SAMPLING

## Solid manure or deep litter

In solid, semi-solid and deep litter manure, the nutrient and dry matter content may vary widely between different spots in the manure pile. Several subsamples should be taken from different parts and depths of the pile.

### Equipment needed:

- ✓ A manure fork or, if available, a solid manure auger or a silage auger.
- ✓ A bucket and a small spade (or other) for mixing subsamples into a composite sample.
- ✓ Plastic bags for subsamples (option 2) and a labelled plastic bag or an airtight container of at least 1 litre for the final sample.
- ✓ Rubber gloves and other personal protection equipment.
- ✓ A cooler with ice or other equipment able to ensure 1-5 °C sample temperature.



# MANURE ANALYSIS

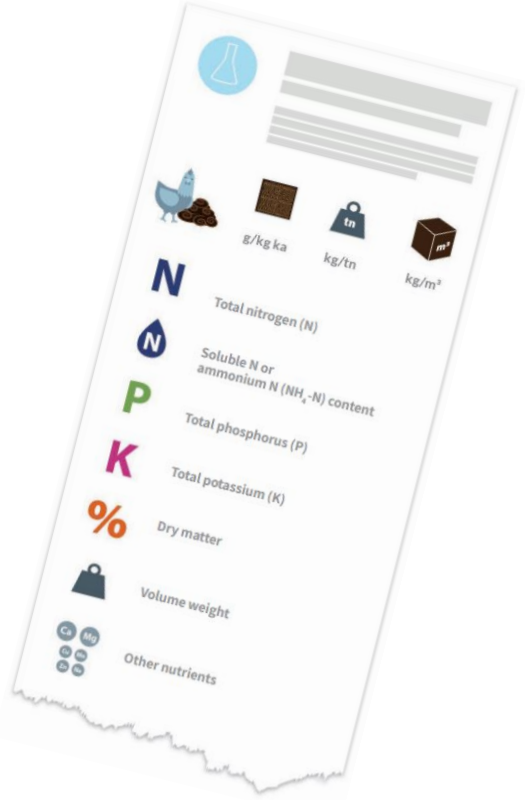
## Handling and transportation of manure samples

- ✓ Freezing the samples before transport to the laboratory is recommended. If a freezer is not available, keep samples in 1-5 °C and transport samples to laboratory within a few days.
- ✓ Send samples Monday-Wednesday to ensure they will reach the laboratory before the weekend.
- ✓ Clearly label all samples with a permanent marker: farm name, type of manure, contact information, and date and time when the sample was collected.

**Send the samples to laboratory with a laboratory-specific order form. If such a form is not available, use 'Manure Standards' accompanying note!**

## Recommended analysis

- ✓ Total solids (TS) / dry matter (DM) content
- ✓ Total nitrogen
- ✓ Ammonium-nitrogen
- ✓ Total phosphorus
- ✓ Total potassium
- ✓ Total carbon / organic matter (volatile solids, VS)
- ✓ pH




## Understanding the analysis report

- ✓ Manure analysis results may be based on wet or dry matter weight:
  - ✓ Nutrient content (%) on a wet weight basis = Nutrient content (%) on a dry weight basis x (% dry matter / 100)
  - ✓ The wet weight value obtained is kg nutrient / kg wet weight slurry
  - ✓ Multiplying by 1000 will convert to kg / ton
- ✓ Total phosphorus (P) may be expressed as P or $P_2O_5$
  where $P = 0.436 \times P_2O_5$
- ✓ Total potassium (K) may be expressed as K or $K_2O$
  where $K = 0.830 \times K_2O$
- ✓ Dry matter is usually expressed as %, the rest being water

# ACCOMPANYING NOTE

**When sending the manure sample to the laboratory, use either laboratory-specific order form or this Manure Standards accompanying note.**

Sample name/ID _____
Date_____
Sampler_____
Contact person_____
Email _____
Mobile_____
NUTS-2 Region_____

## BACKGROUND INFORMATION

**Animal species**

- ❑ Dairy cattle
- ❑ Beef cattle
- ❑ Sows
- ❑ Slaughter pigs
- ❑ Weaned pigs
- ❑ Laying hen
- ❑ Broilers
- ❑ Turkeys
- ❑ Horses
- ❑ Sheep
- ❑ Goats
- ❑ Minks
- ❑ Foxes
- ❑ Other……...

**Bedding material**

- ❑ No bedding
- ❑ Straw
- ❑ Peat
- ❑ Sawdust
- ❑ Other……

**Manure type**

- ❑ Solid manure
- ❑ Deep litter
- ❑ Semi-solid manure
- ❑ Liquid manure / urine
- ❑ Slurry
- ❑ Other……

## LOCATION OF MANURE SAMPLING

**In the housing unit**

- ❑ Slurry channel
- ❑ Slurry pit
- ❑ Slatted floor
- ❑ Solid floor
- ❑ Other……

**In the manure storage**

- ❑ Open slurry tank
- ❑ Covered slurry tank, covering type……
- ❑ Open solid manure storage
- ❑ Covered solid manure storage, covering type……
- ❑ Other……

## ANALYSIS PARAMETRES

- ❑ Dry matter
- ❑ Total nitrogen
- ❑ Ammonium-nitrogen
- ❑ Total phosphorus
- ❑ Soluble phosphorus
- ❑ Total potassium
- ❑ Total carbon
- ❑ Carbon/nitrogen ratio
- ❑ Magnesium
- ❑ Calcium
- ❑ Zinc
- ❑ Manganese
- ❑ Iron
- ❑ Copper
- ❑ Sodium
- ❑ Sulphur
- ❑ pH
- ❑ Other……
- ❑ Other……
- ❑ Other……
- ❑ Other……
- ❑ Other……
- ❑ Other……
- ❑ Other……

## ADDITIONAL INFORMATION