



**Recycling Agricultural, Municipal and Industrial
Residues in Agriculture Network**

A network in the framework of the European System of Cooperative
Research Networks in Agriculture (ESCORENA)

**Glossary of terms
on
livestock manure management
2003**

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The project was funded by the Department of Environment,
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Preface

Manure management, utilisation and the potential impacts on the environment are topics of high relevance across Europe. It is well recognised that internationally coordinated research and development and exchange of experience can greatly benefit science, technology transfer and the development of the corresponding policy framework across Europe.

A major handicap in international collaboration, and a major source of misunderstandings, in these areas is the lack of a standardised terminology. This is not only true for the translation between different languages but also within most languages. For example the term "manure" is used in the following ways:

- organic materials, which supply organic matter to soil together with plant nutrients,
- general term for all livestock excreta recycled in agriculture,
- solid manure result from livestock production.

Furthermore, livestock and manure management practices vary from country to country. Country or regional specific terms used to describe such practices are not always widely or clearly understood. Even between specialists, confusion and overdefinitions may lead to serious misunderstandings and difficulties in understanding manure management systems in other countries. This has also hindered activities aimed at producing surveys of manure management practices across Europe and has considerably restricted the significance and reliability of such surveys.

Some years ago, RAMIRAN, the FAO/ESCORENA "Recycling Agricultural, Municipal and Industrial Residues in Agriculture Network" became aware of the problem of unclear or ambiguous terminology. The Working Group on Solid Manure began to compile a glossary of terms to overcome these uncertainties. Although some progress was made, this proved too complex a task and too time consuming for the fully voluntary Working Group only meeting every two years. Furthermore, it was realised that input was needed from representatives from different parts of Europe with different manure and animal managements to produce a fully comprehensive glossary.

At the 10th RAMIRAN conference in Strebtko Pleso, Slovakia, in May 2002, it was agreed that Brian Pain and Harald Menzi should

- convene a workshop with representatives from different parts of Europe to list and categorise terms used in manure management,
- compile and edit a glossary of terms,
- distribute copies of the glossary to the members of RAMIRAN and other interested parties.

The successful fulfilment of the task was only possible thanks to the enthusiastic support of the project by all the members of the working group involved and by other members of the RAMIRAN network. Many thanks!

Brian Pain and Harald Menzi,
May 2003

Scope of the glossary

The glossary comprises mainly terms concerning manures produced by farm livestock but also includes relevant, broader terms concerning fertilisers, crops, feeding livestock and wider environmental issues. There are also some terms concerning other types of organic materials that are commonly applied to agricultural land. Similarly, although it is primarily a glossary of terms used in Europe, some terms in common use in North America are included. For more details of the later, refer to American Society of Agricultural Engineers (www.asae.org) glossaries: ASAE S292.5 DEC01. Uniform Terminology for Rural Waste Management; ASAE S466.1 DEC98. Nomenclature/Terminology for Livestock Manure Handling Equipment; ASAE S501 JAN01. Uniform Terminology for Livestock Production Facilities.

NB Terms in capital letters in “DEFINTION/DESCRIPTION” are defined/described elsewhere in the glossary.

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TYPES AND COMPOSITION OF MANURE AND ORGANIC WASTES

General terms on manure

MANURE	A general term to denote any organic material that supplies organic matter to soils together with PLANT NUTRIENTS, usually in lower concentrations compared to INORGANIC FERTILISERS.
MANURE MANAGEMENT	The collection, storage, transport and application of MANURES to land. May also include TREATMENT.
MANURE SURPLUS	An amount of MANURE containing PLANT NUTRIENTS in excess of those required by crops.
EXCRETA	Waste expelled from the body: FAECES plus URINE.
EXCREMENT	Solid waste matter discharged from the body: FAECES.
FAECES	Solid waste or undigested material voided by animals.
URINE	Wastes removed from the blood stream via the kidneys and voided as a liquid.
DUNG	FAECES from mammalian LIVESTOCK.
DROPPINGS	Waste voided by POULTRY.
MUCK	A colloquial term for LIVESTOCK MANURE.

Liquid manure

LIQUID MANURE	A general term that denotes any MANURE from housed LIVESTOCK that flows under gravity and can be pumped. There are several different types of LIQUID MANURE arising from different types of LIVESTOCK housing, MANURE storage and TREATMENT.
SLURRY	FAECES and URINE produced by housed LIVESTOCK, usually mixed with some BEDDING material and some water during management to give a LIQUID MANURE with a DRY MATTER CONTENT in the range from about 1 – 10%.

LIQUID FRACTION	<p>Varying degrees of separation of solids and liquid may occur during the management of manures giving rise to LIQUID and SOLID fractions. There are no specific terms to denote the different types of LIQUID FRACTIONS but their properties vary with the proportions of URINE, FAECES, BEDDING and water that they contain. They include:</p> <ul style="list-style-type: none"> • Part of the EXCRETA collected in liquid form together with washing water and some LITTER in TIED STALLS with regular removal of SOLID MANURE (manually or with specific installations). The proportion of URINE and FAECES will vary depending on management practice. Can be called "SLURRY (liquid fraction from liquid/solid manure systems in TIED STALLS)". • Seepage or drainage from MANURE in LIVESTOCK houses or on concrete surfaces used by LIVESTOCK (HARDSTANDINGS) • Seepage or drainage (primarily urine) from cattle bedded on DEEP LITTER straw systems in LOOSE HOUSING. • Seepage or drainage from SOLID MANURE stores. • Liquid from a STRAINER BOX in a SLURRY LAGOON or from a WEEPING WALL SLURRY STORE. • Liquid derived from the MECHANICAL SEPARATION of SLURRY. • Clarified liquid (or SUPERNATANT) obtained from the upper layer following the settlement of SLURRY in a LAGOON. • Thickened liquid remaining following settlement of SLURRY in a LAGOON and removal of the upper layer of clarified liquid.
AERATED SLURRY	Slurry that has undergone the process of AERATION i.e. oxygenation using special equipment, to stabilise or purify or to reduce ODOUR.
AEROBICALLY PROCESSED SLURRY	AERATED SLURRY
ANAEROBICALLY DIGESTED SLURRY	SLURRY that has undergone the process of ANAEROBIC DIGESTION using special plant and equipment, to stabilise, purify, reduce ODOUR and produce BIOGAS.

Solid manure

SOLID MANURE	MANURE from housed LIVESTOCK that does not flow under gravity, cannot be pumped but can be stacked in a heap. May include MANURE from cattle, pigs, poultry, horses, sheep, goats and rabbits. There are several different types of SOLID MANURE arising from different types of livestock housing, manure storage and treatment.
FARMYARD MANURE (FYM)	FAECES and URINE mixed with large amounts of BEDDING (usually straw) on the floors of cattle or pig housing. May also include horse or STABLE MANURE.
DEEP LITTER	Faeces or droppings and urine mixed with large amounts of BEDDING (e.g. straw, sawdust, wood shavings) on the floors of buildings housing any type of LIVESTOCK or POULTRY.
SOLID FRACTION	See LIQUID FRACTION above. Common types of SOLID FRACTION include: <ul style="list-style-type: none"> • Solid remaining (mainly straw BEDDING and FAECES) following the drainage or seepage of the LIQUID FRACTION from CATTLE bedded on straw on a sloping floor e.g. in TIED or TETHER STALLS. • Solids or fibrous material derived from the MECHANICAL SEPARATION of SLURRY
SEMI-SOLID MANURE	MANURE from housed LIVESTOCK that cannot be pumped or stacked in a heap.
YARD SCRAPINGS	Mixture that may contain FAECES, URINE, waste FEED, water from cleaning a HARDSTANDING by mechanical means (e.g. with a tractor mounted or hand-held SCRAPER); can be liquid or semi-solid.
FRESH SOLID MANURE	SOLID MANURE immediately after removal from the LIVESTOCK housing.
STORED SOLID MANURE.	SOLID MANURE that, following removal from the LIVESTOCK housing, has undergone a period of storage in a heap.
COMPOSTED MANURE	SOLID MANURE that has undergone a COMPOSTING process; COMPOST.
HORSE MANURE	Horse FAECES, URINE and straw BEDDING.

STABLE MANURE	Manure from animals housed in STABLES e.g. HORSE MANURE.
POULTRY LITTER	DROPPINGS mixed with a layer of, for example sawdust, on the floors of buildings housing POULTRY.
BROILER LITTER	DROPPINGS mixed with a layer of absorbent material, for example sawdust, wood shavings, straw, on the floors of buildings housing BROILER CHICKENS (i.e. raised for meat).
BROILER MANURE	BROILER LITTER
TURKEY MANURE	As for BROILER LITTER but from buildings housing turkeys
LAYING HEN MANURE	DROPPINGS collected in buildings housing CHICKENS for egg production.
LAYER MANURE	LAYING HEN MANURE
DEEP PIT MANURE	DROPPINGS collected in a PIT beneath cages housing LAYING HENS.
VERMICOM-POST	SOLID MANURE that has undergone the process of VERMICOMPOSTING.
MANURE ASH	Residue from the incineration of SOLID MANURE (normally BROILER LITTER) in a power station.
ASHED MANURE	MANURE ASH

Farm waste water

WASTEWATER	Water contaminated with FAECES, URINE, milk, chemicals etc. so posing a risk of pollution but of little value as a fertiliser.
WASH WATER	Water used to clean milking equipment and parlours, HARDSTANDINGS used by LIVESTOCK, farm machinery etc.
DIRTY WATER	Water derived from washing of equipment and floors in milking parlours, rainfall RUN-OFF from concrete areas or HARDSTANDINGS used by LIVESTOCK and contaminated with FAECES, URINE, waste animal feed etc. Sometimes referred to as BROWN WATER. Contains organic matter and so poses a risk of water pollution but has negligible FERTILISER VALUE.

PARLOUR WASHINGS	Water used for washing equipment and floors in milking parlours. Sometimes referred to as GREEN WATER.
MILK-HOUSE WASH WATER	PARLOUR WASHINGS
DAIRY SHED EFFLUENT	DIRTY WATER
COLLECTING YARD WASHINGS	Water used for washing concrete areas or HARDSTANDINGS on which LIVESTOCK are gathered e.g. DAIRY COWS prior to milking.
SILAGE EFFLUENT	Liquid seeping or draining from a crop (e.g. grass) during ENSILING to produce SILAGE. Highly polluting potential but very low FERTILSER VALUE.

Other organic wastes

ORGANIC WASTES	A general term for any wastes from organic rather than inorganic origin and so containing carbon (e.g. LIVESTOCK MANURE, SEWAGE SLUDGE, ABATTOIRE WASTES)
ORGANIC RESIDUES	Organic material resulting from dead plant material or by-products from processing organic materials of the food industry or other industry.
SLUDGE	The liquid or semi-solid fraction arising from the sedimentation or flocculation of liquid waste or LIQUID MANURE.
SUPERNATANT	The upper LIQUID FRACTION after sedimentation of liquid waste or LIQUID MANURE.
BIOSOLIDS	Organic solids resulting from waste water TREATMENT that can be usefully recycled.
SEWAGE	Liquid domestic and municipal waste.
RAW SEWAGE	Untreated liquid domestic and municipal waste.
SEWAGE SLUDGE	By-product of SEWAGE treatment that concentrates solids. It contains significant quantities of PLANT NUTRIENTS.
UNTREATED SLUDGE	Product of the sedimentation of screened SEWAGE that has not been subjected to any chemical, biological or heat TREATMENT; typically has a DRY MATTER content of 2-7%.
LIQUID UNDIGESTED SLUDGE	UNTREATED SLUDGE.

LIQUID DIGESTED SLUDGE	Product of TREATMENT of SEWAGE in ANAEROBIC DIGESTERS; typically with a DRY MATTER content of 2-5%
CAKE SLUDGE	Produced by pressing centrifuged liquid sludge after pre-treatment with lime or other conditioning chemicals; typically with a DRY MATTER content of 20-35%.
ABATTOIR WASTE	Blood and gut contents together with MANURE from LIVESTOCK awaiting slaughter.
SLAUGHTER- HOUSE WASTE	ABATTOIR WASTE

LIVESTOCK

General livestock terms

LIVESTOCK	Domesticated animals such as CATTLE, PIGS, POULTRY, SHEEP, horses, goats. Any creature kept for the production of food, wool, skin or fur or for the purpose of its use in the farming of the land or for amenity purposes
HOUSED LIVESTOCK	LIVESTOCK that are kept indoors for all or part of the year.
RUMINANT	An animal that has a complex digestive system including a four-part stomach. They consume large amounts of fibrous food such as grass that their stomach are able to store and digest. Includes CATTLE, SHEEP, GOATS, DEER.
MONOGASTRIC	An animal with one simple stomach, such as PIGS, as opposed to a RUMINANT.
FATSTOCK	LIVESTOCK fattened for sale in a market.
BREEDING STOCK	The production of offspring from LIVESTOCK. BREEDING STOCK are animals kept to produce offspring rather than for slaughter.
REARING	The keeping of growing LIVESTOCK
FATTENING	Rearing of livestock for meat production
LIVEWEIGHT	The weight of a live animal (as oppose to the weight of the carcass or DEADWEIGHT)
DEADWEIGHT	The weight of the dressed or prepared carcass.
CARCASS WEIGHT	DEADWEIGHT
SLAUGHTER WEIGHT	Weight of a live animal immediately prior to slaughter.
LIVESTOCK UNIT (LU)	A unit used to compare or aggregate numbers of animals of different species or categories. Equivalences are defined on the feed requirements (or sometimes nutrient excretion). For example for the EU, one 600 kg DAIRY COW producing 3000 litres of milk per year equals 1 LU, a SOW equals 0.45 LU and a EWE equals 0.18 LU.
ANIMAL UNIT	LIVESTOCK UNIT

DUNGING UNIT LIVESTOCK UNIT in countries limiting LIVESTOCK density via nutrient excretion.

STOCKING RATE The number of LIVESTOCK (or LIVESTOCK UNITS) per unit area of land.

Cattle

CATTLE A collective term for BOVINE LIVESTOCK. DAIRY CATTLE are kept for milk production and BEEF CATTLE are reared for meat.

BOVINE Concerning CATTLE.

COW A female bovine animal. For CATTLE, the female is usually termed COW on bearing her second CALF.

DAIRY COW Cows kept for producing milk or for rearing CALVES for a dairy herd.

DAIRY FOLLOWERS Young stock on a dairy farm not yet in milk but growing to become DAIRY COWS.

CALF (plural CALVES) The offspring of a cow. Males are termed BULL CALVES and females HEIFER CALVES.

HEIFER A female cow that has not yet born two CALVES. A pregnant heifer is termed an IN-CALF HEIFER. Sometimes used for female CATTLE before giving birth to a CALF.

BEEF COW Cow kept for mainly for rearing CALVES for beef production.

SUCKLER COW A cow that is allowed to rear its own CALF before being used for beef production rather than for milk production.

**NURSING COW,
NURSE COW** SUCKLER COW

STORE CATTLE CATTLE kept at a steady rate of growth prior to later fattening for slaughter.

BULLOCK A castrated BULL.

STEER BULLOCK

BULL An uncastrated adult BOVINE animal.

BEEF CATTLE Cattle kept for the production of beef. Usually slaughtered at 450-550 kg live weight at an age of 13-16 months for intensive in-house feeding (SILAGE, CONCENTRATES) or 17-30 months for grazed animals.

Pigs

PIG	A domesticated animal derived from the wild boar kept for meat production.
SWINE	PIGS
SOW	An adult female PIG after having produced her first LITTER of PIGLETS.
DRY SOW	Adult female PIG between lactations.
GESTATING SOW	Pregnant SOW.
FARROWING SOW	Sow between parturition (giving birth) and weaning the PIGLETS.
NURSING SOW	FARROWING SOW
PIGLET	The offspring of a SOW
SUCKLING PIGLET	Young PIG still nursing with the sow.
GILT	A young female PIG before she has produced a LITTER.
LITTER	All the offspring born to a female (usually a PIG) at one time.
BOAR	An uncastrated male PIG used for breeding.
FATTENING PIG	PIG kept for pork production between an age of about 10 weeks (WEANERS) and slaughter (usually at 90-110 kg).
FATTENER	FATTENING PIG
WEANER	A PIGLET that has been weaned from the SOW'S milk at 3-6 weeks old but has not reached the age of about 10 weeks (and 25-30 kg LIVEWEIGHT) when it is termed a FATTENER.
GROWER (pigs)	FATTENING PIG from 20-25 kg to about 60 kg.
FINISHER	FATTENING PIG between about 60 kg and slaughter.
FINISHING PIG	FINISHER
PORK PIG	A PIG bred for quick growth and maturity at light weight (about 40-60 kg LIVEWEIGHT)
PORKER	PORK PIG
BACON PIG	A PIG reared with a long carcass bearing minimum fat for bacon and usually slaughtered at 60-80 kg LIVEWEIGHT

BACONER	BACON PIG
CUTTER	A general purpose PIG, different parts of which may be used for pork, bacon or processing after slaughter at about 70 kg LIVEWEIGHT or heavier.
HEAVY HOG	A general purpose PIG slaughtered at 105 kg LIVEWEIGHT or heavier and used for bacon, pork, ham and various by-products.
Poultry	
POULTRY	Domesticated birds (fowl) kept for meat or egg production. Includes chickens, turkeys, geese (singular = goose) and ducks.
FOWL	General term for birds often used for domestic CHICKEN.
CHICKEN	Most important POULTRY species including LAYING HENS, BROILERS
CHICK	A young bird about to be hatched or newly hatched.
LAYING HENS	CHICKENS kept for egg production.
LAYER	LAYING HEN
GROWER (poultry)	CHICKEN between a CHICK and a PULLET before it starts to lay eggs, usually up to 18-20 weeks old.
BROILER	CHICKENS reared for meat production.
TABLE BIRD	BROILER
COCKEREL	A male CHICKEN usually less than 18 months old or male turkey less than 12 months old.
CAPON	A castrated COCKEREL
PULLET	A female CHICKEN in its first egg laying year between 20 weeks and 18 months old. A young LAYER.
BROILER BREEDER	Breeding hens kept for laying eggs to produce BROILERS.
TURKEYS	Large POULTRY species kept for the production of meat.
POULT	A young turkey less than 8 weeks old.
DUCK	Usually denotes a female duck. The male is called a drake.
DUCKLING	A young duck, usually less than 8 weeks old.

GOOSE	Large aquatic bird sometimes kept as domestic animal for meat and for feathers.
GEESE	GOOSE plural
GUINEA FOWL	A pheasant like bird from Africa raised for ornamental qualities, meat, feathers for crafts and fly tying, or vermin control (<i>Numida meleagris</i>).
PHEASANTS	A species of game bird that comes in many breeds and varieties. They are raised for meat, feathers, and ornamental value or to be released into the wild for shooting.

Other livestock

SHEEP	A ruminant kept mainly for meat and wool and sometimes for milk(SHEEP = singular or plural).
EWE	An adult female SHEEP.
LAMB	A young SHEEP up until it is weaned or the meat derived from it.
RAM	An uncastrated male SHEEP.
TUP	RAM
WETHER	A castrated, adult male SHEEP.
OVINE	Concerning SHEEP
GOAT	A RUMINANT allied to SHEEP and kept for milk, meat and sometimes wool.
GOATLING	A female GOAT between one and two years old.
NANNY- GOAT	An adult female GOAT.
CAPRINE	Concerning GOATS.
MARE	Mature female horse
STALLION	Mature uncastrated male horse.
GELDING	Castrated male horse.
FILLY	Young female horse
FOAL	Young horse in its first year.
COLT	Young uncastrated male horse.
RABBIT	A domesticated rodent kept for fur and meat.

DOE A female RABBIT, DEER or hare.

BUCK A male RABBIT, DEER, GOAT or hare.

Feeding

RATION The allowance of food given to an animal.

- MAINTENANCE RATION.
- PRODUCTION RATION.

MAINTENANCE RATION The amount of food needed by an animal to keep it healthy and maintain a constant LIVEWEIGHT.

PRODUCTION RATION The amount of food needed by an animal in excess of MAINTENANCE to gain weight, produce milk etc.

TOTAL MIXED RATION Containing all the ROUGHAGE and CONCENTRATE components of the RATION mixed together.

DIET The food offered to LIVESTOCK.

FEED The various foods available for farm LIVESTOCK.

FEEDSTUFF FEED

FEEDINGSTUFF FEED

FODDER Food given to LIVESTOCK that may have been dried e.g. STRAW, HAY but not manufactured. Sometimes used loosely to mean FORAGE.

FODDER CROP FODDER

FORAGE Crops consumed in the green state by LIVESTOCK, particularly CATTLE and horses, e.g. kale, maize, lucerne, or made into SILAGE. Sometimes used loosely to mean FODDER.

FORAGE CROP FORAGE

SILAGE A FEEDSTUFF consisting of a FORAGE CROP e.g. grass, maize harvested in the green state and preserved by ENSILING in a SILO or CLAMP. This involves the FERMENTATION by bacteria of carbohydrates in the plant material to organic acids and PROTEIN to AMINO ACIDS.

ENSILING To make SILAGE from green fodder.

SILO A container in which SILAGE is made and stored. It may be in the form of a SILAGE CLAMP or BUNKER SILO or a wood, concrete or steel tower. Also a term used to describe some types of grain store.

SELF-FEED SILAGE	A feeding system in which LIVESTOCK, normally CATTLE, are allowed to graze on SILAGE in a CLAMP. The amount taken is usually controlled by an electric fence or movable barrier a short distance from the silage face.
SILAGE CLAMP	A heap of SILAGE usually on a rectangular concrete base and supported by three walls. It is usually covered by a plastic sheet to maintain the ANAEROBIC conditions needed for FERMENTATION.
BUNKER SILO	SILAGE CLAMP
SILAGE EFFLUENT	The liquid arising from a crop during ENSILING e.g. in a CLAMP. It is usually collected in a shallow channel and stored in a PIT (or EFFLUENT TANK) or in the SLURRY store because it has a very high BIOLOGICAL OXYGEN DEMAND so poses a risk of water pollution.
ROUGHAGE	A FEEDSTUFF containing fibre in significant amounts such as HAY and STRAW.
HAY	A term applied mainly to grasses (but may include legumes and herbs) that have been cut and dried, usually in the field, to preserve as FODDER.
STRAW	A term used mainly for the dry stems of CEREALS after the grain has been removed. May be used for BEDDING or as a low quality FEEDSTUFF.
CONCENTRATES	A manufactured FEEDSTUFF with a high food value relative to volume and a low fibre content usually for dairy cows. May be rich in PROTEIN, CARBOHYDRATE or FAT.
CAKE	A general term for processed FEEDSTUFF such as CONCENTRATES
MEAL	A FEEDSTUFF consisting of a single or a mixture of finely ground ingredients such as cereals, oil seeds, fish etc and commonly fed to PIGS and POULTRY.
MINERALS	Minerals, i.e. inorganic substances including TRACE ELEMENTS, fed to LIVESTOCK and that are required for the normal functioning, growth and health of the animal. Often added to CONCENTRATES or CAKE.
MINERAL MIXTURES	MINERALS
COMPOUND FEED	LIVESTOCK feed composed of several different FEEDINGSTUFFS, MINERALS and TRACE ELEMENTS in proportions to provide a balanced RATION or DIET.

PROTEIN	Complex, organic compound made up of AMINO ACIDS that contain carbon, oxygen, nitrogen, hydrogen and sometimes phosphorus and sulphur. With water, they form the basic constituents of living cells and of the structure of plants and animals.
AMINO ACID	The chemical units that link together to form PROTEINS and are of fundamental importance to life.
ESSENTIAL AMINO ACIDS	Those AMINO ACIDS that cannot be made by a plant or animal but must be obtained from the environment or food.
CARBOHYDRATE	Complex, organic compounds containing carbon, hydrogen and oxygen that are essential to all living organisms. The energy stored in carbohydrates is released to power living processes.
FAT	Storage material in living organisms found mainly as oils in plants and solid forms (adipose tissue) in animals. Most animals deposit fat in their bodies as an energy store. Also used to denote LIVESTOCK reared for their meat (FATSTOCK).
VITAMIN	A class of organic substances required by animals in small amounts for normal functioning, growth and health. Farm animals can synthesise some e.g. vitamin C, in their bodies but most must be provided in their DIET.
ENZYME	A type of PROTEIN present in living organisms that catalyses (speeds up) chemical changes without being changed itself.
LIQUID FEED	Normally refers to a system for feeding pigs in which FEED is provided in liquid form dissolved or suspended in water.
DRY FEED	The provision of food e.g. to pigs or poultry in dry form as a MEAL.
PHASE FEEDING	The provision of different RATIONS or DIETS to LIVESTOCK at different stages of growth or performance to match the RATION closely to the requirements of the animals.
Grazing	
MEADOW	An area of grassland used to produce HAY or SILAGE rather than for grazing
PASTURE	An area of grassland used for grazing rather than cutting for HAY or SILAGE.
PADDOCK	A relatively small, enclosed PASTURE.
SET STOCKING	A grazing system e.g. for CATTLE, SHEEP, in which a fixed number of LIVESTOCK graze a given area for the entire season.

STRIP GRAZING	A grazing system e.g. for CATTLE in which the animals are given access to a limited area of fresh PASTURE up to twice daily by means of a movable fence. Grazed strips are “back-fenced” to allow for regrowth of the grass.
ZERO GRAZING	A system for feeding CATTLE in which grass or other FODDER is cut daily and taken back to the animals in a building or YARD.
LEY	Land temporarily sown to grass and then ploughed.
CEREAL	Cultivated members of the grass family that are grown for their seed or grain that is used for animal FEED, bread making etc.
TRAMLIN	Accurately spaced, narrow pathways left in e.g. a CEREAL crop to provide wheel guide marks for tractors and machinery used in subsequent operations e.g. spraying, FERTILISER APPLICATION.
STUBBLE	The part of the crop left in the ground after harvest e.g. CEREAL STUBBLE.
ROTATIONAL GRAZING	A grazing system e.g. for CATTLE, in which successive areas or PADDOCKS, are intensively grazed for a period and then rested to allow for regrowth of the grass.

LIVESTOCK HOUSING

General housing terms

ANIMAL HOUSE	A general name for a building in which LIVESTOCK are kept.
BARN	A general name for a farm building used for housing livestock, storing machinery or crops etc
SHED	As for BARN
STABLE	Building or part of a building for horses.
FEEDLOT	A concentrated, confined livestock operation outdoors wherein the LIVESTOCK are fed at the place of confinement and crop production is not sustained.
NATURALLY VENTILATED BUILDING	A building commonly used for housing CATTLE in which ventilation is provided by gaps designed into the walls and roof.
FORCED VENTILATED BUILDING	A building commonly used for housing intensive PIGS, POULTRY or CALVES in which ventilation is provided by electrically powered fans that are controlled by the temperature within the building..
FAN VENTILATED BUILDING	FORCED VENTILATED BUILDING
AUTOMATICALLY CONTROLLED NATURAL VENTILATION (ACNV)	A building commonly used for housing PIGS in which ventilation is provided by flaps or vents designed into the walls and controlled by the temperature within the building.
PEN	A small enclosure for LIVESTOCK, within a house or outdoors.
STALL	A division or compartment for an animal, usually within a house.
CRATE	A small PEN or container for LIVESTOCK, allowing very restricted movement.
BEDDING	Material placed on the floors of LIVESTOCK houses to provide some comfort to the animals and to absorb moisture. Commonly straw, chopped straw, sawdust, wood shavings, sand, peat. Rubber or plastic mats may also be provided for animals to lie on.
HOUSED PERIOD	Period for which LIVESTOCK are kept within a building, e.g. during the winter months.

PART TIME GRAZING	Grazing by HOUSED LIVESTOCK for a proportion of the time e.g. grazing by day but housed by night.
SOLID FLOOR	The floor of a building normally constructed of a hard, impermeable material such as concrete.
SLATTED FLOOR	A metal, concrete or plastic floor with slots that allow FAECES and URINE from LIVESTOCK to drop into a CHANNEL or PIT beneath.
FULLY SLATTED FLOOR	A floor where the whole area is SLATTED.
PARTIALLY SLATTED FLOOR	A floor that is partly SOLID and partly SLATTED. Commonly used in PENS for housing PIGS and designed so that the animals defecate and urinate on the slatted part.
CHANNEL	A long, watertight compartment often constructed beneath a slatted or gridded floor in a building designed to collect FAECES and URINE as SLURRY OR LIQUID MANURE prior to discharging under gravity to longer-term storage. A gate valve or sluice gate may be built into the channel to provide short-term storage. Commonly used in housing for FATTENING PIGS or TIED STALL for CATTLE.
OVERFLOW CHANNEL	As CHANNEL, except a barrier in the channel retains a layer of SLURRY or LIQUID MANURE in the channel. The retained layer of liquid prevents the build up of solids that may block the channel. The surplus flows over the barrier and out of the building.
FLUSHED CHANNEL	As CHANNEL, except the channel is regularly emptied by opening a gate valve or sluice gate and flushing out the contents with water or treated SLURRY.
GUTTER	Normally refers to a shallow CHANNEL that may be preformed e.g. to collect rainfall from a roof, or built into a concrete floor to collect and transport e.g. a LIQUID FRACTION. May also mean the same as CHANNEL.
DEEP PIT	A below-ground, watertight compartment for collecting and storing LIQUID MANURES or SLURRY or POULTRY DROPPINGS.
STRAW FLOW SYSTEM	A STALL or PEN with a slightly sloping floor with STRAW being provided or dispensed at the top of the slope and “flowing” down the slope to be collected as SOLID MANURE at the bottom.

- GROOVED FLOOR** A type of **SLATTED FLOOR** in which the slots are mostly sealed on the underside leaving rows of holes through which **URINE** can drain rapidly. Used as a means of reducing **AMMONIA EMISSIONS** from **CATTLE** houses in the Netherlands.
- SCRAPER** A device used for cleaning the floors of concrete surfaces such as **PASSAGEWAYS** and **HARDSTANDINGS** or emptying **CHANNELS** in **LIVESTOCK** houses, through scraping **FAECES**, **URINE**, waste **BEDDING** and **FEED** into a **CHANNEL** or **PIT** etc. Include:
- *Manual scraper.* Either simple hand-held tools, often with a rubber scraper, or equipped with motorised wheels used for cleaning **PASSAGEWAYS** and **HARDSTANDINGS**.
 - *Tractor mounted scraper.* Mounted on the front or rear of a tractor, these are commonly used for cleaning **PASSAGEWAYS** in **CATTLE** houses.
 - *Automatic scraper.* These are usually fixed permanently in **PASSAGEWAYS** or **CHANNELS** and driven by a stationary **MECHANICAL** or **HYDRAULIC POWER** unit. In **CHANNELS**, they usually comprise chains or cables fitted with metal flaps, blades or flights. Rubber scrapers are more common for cleaning **PASSAGEWAYS**.
 - *Reciprocating scraper.* Scraper where the direction of movement is reversed at intervals.
- MECHANICAL POWER** Power is transferred from a fixed electric motor by means of a gear reduction device to chains, cables etc that operate a **SCRAPER** or other equipment. Reciprocating movement (e.g. for reciprocating **SCRAPERS**) is achieved by alternating the direction of rotation of the motor.
- HYDRAULIC POWER** A pump powered by an electric motor supplies hydraulic rams with oil to drive equipment such as a **SCRAPER**. Such systems give greater flexibility in power transfer between electric motors and equipment and are more common in colder climates because they are less likely to freeze up. Reciprocating movement is achieved through the use of dual rams and a pressure sensitive valve.
- PISTON, RAM, PRESS RAM.** These are usually **HYDRAULICALLY POWERED** and designed to press **MANURE** through **CHANNELS** or large pipes within **LIVESTOCK** houses. They can also be used to move **MANURE** from the house to a store.
- SPIRAL SCREW** A screw or **AUGER** is fitted into a pipe and is powered by an electric motor. They are used to lift **MANURE** from, for example, a **CHANNEL** in a house to a store or heap.

CONVEYOR ELEVATOR These comprise a powered SPIRAL SCREW or moving belt to move MANURE. Belt CONVEYORS are suitable for SOLID MANURE.

A CONVEYOR angled upwards to lift MANURE e.g. into a store or heap.

AUGER A large rotating screw for moving manure.

Cattle housing

TIED STALLS A housing design in which LIVESTOCK (usually CATTLE) are permanently restrained in a stall whilst they are kept in the house and so have restricted freedom of movement. The floors of the stalls may be:

- Level concrete with a CHANNEL covered by a grid at the rear of the animals to collect FAECES and URINE as SLURRY.
- Sloping concrete with BEDDING (e.g. straw, chopped straw, sawdust) and a shallow gutter at the rear of the animals to collect part of the FAECES and the URINE, whilst part is regularly removed as SOLID MANURE. In some cases the gutter is equipped with a drainage pipe to collect seepage.
- As above but with a deeper CHANNEL instead of a gutter to collect and store the LIQUID FRACTION.

TETHER STALLS TIED STALLS

SEMI-TIED STALLS As above except DAIRY COWS are released to walk to a milking parlour or to be fed. Often most of the feed is served in front of the stalls.

LOOSE HOUSING Animals have free access over the whole area of the building or PEN. It is common for a deep layer of BEDDING (usually straw) to be spread over the floor that is removed from the building, typically once or twice per winter, as FARMYARD MANURE. A concrete floor, which is cleaned more frequently by scraping, may be provided in the area where the animals stand to feed and/or drink.

CUBICLE HOUSE The building is divided into rows of individual stalls or cubicles in which animals lay when at rest but are not restrained. A small amount of BEDDING (e.g. sawdust, wood shavings, chopped straw, sand, rubber or plastic mats) is placed in each cubicle. FAECES and URINE are excreted in the concrete PASSAGEWAYS between the rows of cubicles. PASSAGEWAYS may be SLATTED FLOORS, concrete, asphalted concrete or concrete covered with rubber. PASSAGEWAYS are cleaned at least once per day e.g. by a *tractor mounted* or more frequently by an *automatic scraper* and the manure is removed from the building as SLURRY.

Pig housing

PIGGERY	A place where PIGS are kept.
PIG HOUSE	Pigs are normally kept in thermally insulated buildings with forced or natural ventilation. There are large differences in PIG housing systems both between and within countries in Europe. Also, different designs are used for different stages of production (SOWS, weaned PIGLETS from weaning up to 25-30 kg LIVEWEIGHT, GROWERS-FINISHERS or FATTENERS from 25-30 kg up to 90 – 160 kg LIVEWEIGHT).
INDIVIDUAL HOUSING FOR MATING AND GESTATING SOWS	<p>Pregnant SOWS are kept in individual CRATES.</p> <ul style="list-style-type: none"> • SOWS are kept in CRATES measuring about 2m X 0.6m, the rear end being equipped with a SLATTED FLOOR to collect SLURRY in a deep or shallow CHANNEL that is emptied at intervals depending on its` capacity. A central PASSAGEWAY with a SLATTED FLOOR runs between rows of CRATES. • Sows are kept in CRATES similar to above but with a solid concrete floor often with a layer of straw BEDDING to produce SOLID MANURE or FARMYARD MANURE. There is a drain system in the central passageway to collect and remove LIQUID MANURE that is mainly URINE.
GROUP HOUSING FOR MATING AND GESTATING SOWS	<p>Several pregnant SOWS are kept together in enclosed compartments or PENS that may have:</p> <ul style="list-style-type: none"> • A solid concrete floor with a deep layer of straw BEDDING to produce SOLID MANURE or FARMYARD MANURE. • A PARTIALLY SLATTED FLOOR. This provides a lying area with straw BEDDING and a SLATTED FLOOR above a collection CHANNEL in the dunging and feeding area that may be emptied using SCRAPERS.
HOUSING FOR FARROWING SOWS	<p>SOWS that are about to give birth may be:</p> <ul style="list-style-type: none"> • Confined with restricted movement in a FARROWING CRATE to prevent her lying on the. The floor may be FULLY or PARTIALLY SLATTED with SLURRY collected in a CHANNEL or DEEP PIT. The lying area for the PIGLETS is usually not slatted. • Allowed free movement in PENS with PARTIALLY SLATTED FLOORS to collect SLURRY and separate lying areas with a SOLID FLOOR for the SOW and for the PIGLETS. PIGLETS may be reared to 25-30 kg LIVEWEIGHT in these systems.

HOUSING FOR WEANERS	<p>WEANERS are kept in small groups (often 8-12) in PENS houses that are heated and ventilated. PENS may have:</p> <ul style="list-style-type: none"> • A SOLID FLOOR with straw BEDDING to produce SOLID MANURE • A FULLY SLATTED FLOOR or • A PARTIALLY SLATTED FLOOR to produce SLURRY.
FLAT DECK	<p>This was developed in 1960/70 as a specialised housing system for rearing weaned pigs. It originally comprised a low, well-insulated building with a linked heating and ventilation system to maintain temperature at any desired level. Each house contains several PENS with FULLY SLATTED FLOORS above a SLURRY CHANNEL. The system has evolved over the years and the term is now often used to describe loosely any SLURRY- based housing system for WEANERS.</p>
HOUSING FOR GROWERS-FINISHERS	<p>A thermally insulated, FORCED or NATURALLY VENTILATED house divided into PENS containing groups of PIGS. May have:</p> <ul style="list-style-type: none"> • FULLY SLATTED FLOOR. PENS have FULLY SLATTED FLOORS with no physical separation between lying, feeding and dunging areas. SLURRY is collected in a CHANNEL or PIT beneath the floor that may connect to a central CHANNEL for emptying. • PARTIALLY SLATTED FLOOR. Similar to above except the floor is divided into a slatted area (for dunging), with a SLURRY CHANNEL or PIT beneath it, and a solid, non-slatted (for feeding and resting) area. Some straw is sometimes provided where there is a SOLID FLOOR and a smaller slatted area. The SOLID FLOOR may have a slight slope so that SLURRY and straw moves towards the slats (STRAW FLOW SYSTEM). • SOLID FLOOR. Straw is spread over the floor to provide BEDDING or in smaller amounts for animal welfare.
OUTDOOR PIGS	<p>SOWS and weaned pigs (WEANERS) up to 30-35kg LIVE-WEIGHT are kept in outdoors in fields with small huts for shelter.</p>
KENNEL	<p>A type of pig PEN. A sleeping section with a hinged roof that can be raised or lowered to control temperature and ventilation.</p>
VERANDA HOUSE	<p>A type of house for weaned pigs (WEANERS) comprising two rows of KENNELS with a central PASSAGEWAY all under the same roof. Outside the roof on each side of the building there is a SLATTED FLOOR area, or veranda, above a SLURRY CHANNEL.</p>
MONOPITCH HOUSE	<p>A type of NATURALLY VENTILATED house for finishing pigs (FINISHERS) in which the roof slopes from front to back. It may be open-fronted for ventilation with wind barriers or have ventilation flaps or shutters at the front and rear.</p>

Poultry housing

- BATTERY CAGE** A housing system in which LAYING HENS are kept in cages arranged in long tiers.
- BROILER HOUSE** A house for intensive BROILER production. It is usually a simple closed building with natural or artificial light, thermally insulated and force ventilated. It may also be constructed with open side walls covered with mesh screens and located so that they are exposed to a natural stream of air. Additional ventilation fans may be fitted for use during hot weather. The birds are kept on litter e.g. chopped straw, wood shavings, shredded paper, spread over the entire floor area. Manure (BROILER LITTER) is removed at the end of each growing period.
- DEEP LITTER HOUSE FOR LAYING HENS** A simple closed building that is thermally insulated and with forced ventilation or natural ventilation. At least a third of the floor area must be covered with BEDDING (e.g. chopped straw, wood shavings) and two thirds arranged as a PIT covered with slats to collect DROPPINGS over the 13 – 15 month egg laying period. Laying nests, feeders and water supply are placed over the slatted area to keep the litter dry.
- BATTERY CAGE HOUSE FOR LAYING HENS** A closed building with forced ventilation and with or without a lighting system. Birds are kept in tiered cages, usually made of steel wire, arranged in long rows. DROPPINGS fall through the bottom of the cages and are collected and stored underneath in a DEEP PIT or CHANNEL or are removed by a belt or SCARPER system. The DROPPINGS from laying hens in battery systems are not mixed with other material such as litter and may be dried or have water added to make the manure easier to manage. There are three common battery systems for laying hens in use in Europe:
- DEEP PIT HOUSE.
 - STILT HOUSE.
 - MANURE BELT house.
- DEEP PIT HOUSE** The birds are housed in cages in one or more tiers. DROPPINGS fall into a manure pit (DEEP PIT) or a CHANNEL beneath the cages by themselves or with the aid of a SCRAPER together with spilled water from the drinkers. The LAYER MANURE is removed once a year or less frequently by scraper or FRONT LOADER on a tractor. In some systems, the ventilation system for the house is designed so that warm air is used to dry the wet manure in the DEEP PIT or CHANNEL.

STILT HOUSE	This is similar to a DEEP PIT house except that there is a variable valve between the cage and dropping storage areas and large openings in the dropping store walls that allow wind to pass through and assist drying. Cage and dropping areas of the building are separated so DROPPINGS can be removed at any convenient time without disturbing the birds.
MANURE BELT	Movable belts, e.g. made of “non –stick” polypropylene, below the cages on which DROPPINGS are collected and are transported outside the house to a closed storage. In improved systems, there is provision to dry the MANURE on the belts by forced air through perforated pipes or drying tunnels over the cages.
ENRICHED CAGES	A new type of BATTERY CAGE for LAYING HENS that, compared to conventional systems, provides more space for the birds and is equipped with structural features to stimulate natural behaviour. In addition, litter of sand, wood shavings etc. is used in the cages. DROPPINGS are removed via MANURE BELTS.
AVIARY HOUSE, PERCHERY	A house for LAYING HENS with thermal insulation, forced ventilation and either natural or artificial light. The birds have freedom of movement over the entire house and a scratching area. The house is divided into different functional areas for feeding and drinking, sleeping and resting, scratching, egg laying. DROPPINGS may be collected in a DEEP PIT or removed to by a MANURE BELT.
TURKEY HOUSE	This is very similar to a BROILER HOUSE, but more commonly with open walls, used for rearing turkeys for meat. Variations in design include: <ul style="list-style-type: none">• <i>Closed house.</i> LITTER (e.g. wood shavings or sawdust) is removed from the floor and fresh provided nine times during the fattening period. This keeps the MANURE very dry and reduces AMMONIA EMISSIONS.• <i>Partially ventilated littered floor.</i> About 75% of the floor area is solid and 25% is a raised platform with a SLATTED FLOOR covered with nylon cloth. Litter (wood shavings) is spread over both floor areas and air is blown through the slatted area to dry the MANURE. The system gives lower AMMONIA EMISSIONS than conventional systems.
DUCK HOUSE	This is very similar to a BROILER HOUSE and used for rearing ducks for meat. Variations include: <ul style="list-style-type: none">• PARTLY SLATTED/PARTLY LITTER floor• FULLY SLATTED floor.
FREE-RANGE	A system for keeping POULTRY in which birds are provided with houses and allowed to run free over a field or large enclosed area of land.

Hardstandings

HARD STANDING	<p>A general term for any outdoor, normally unroofed area with a hard surface usually of concrete. Include:</p> <ul style="list-style-type: none"> • COLLECTING YARDS, where dairy cows assemble before milking • FEEDING or LOAFING YARDS, where cattle or pigs are fed or simply provided with access to the outside of houses. • WALKWAYS or PASSAGEWAYS, providing access for animals to different areas of the farm. • SHEEP HANDLING YARDS • <i>Crop storage areas</i> • FARMYARD MANURE <i>storage area</i> • <i>Machinery storage</i>
YARD	HARDSTANDING
COVERED YARD	A YARD with a roof to exclude rain.
COLLECTING YARD	A HARDSTANDING where DAIRY COWS are gathered prior to milking. May be in or outside the building.
FEEDING YARD	A HARDSTANDING where LIVESTOCK, usually CATTLE, are fed often outside the house.
LOAFING YARD	A HARDSTANDING where housed LIVESTOCK, usually CATTLE, are provided access for exercise, often outdoors.
EXERCISE YARD	LOAFING YARD
PASSAGEWAY	Usually an area with a hard surface to provide LIVESTOCK (and farm staff and machinery) access to different parts of the building or between buildings.
WALKWAY	PASSAGEWAY
SHEEP HANDLING YARD	An area (usually a HARDSTANDING) where SHEEP are gathered e.g. prior to shearing, dipping, veterinary treatment etc.

MANURE STORAGE

Liquid manure stores

PIT	A below-ground store with watertight floor and walls and a solid or gridded lid commonly used for short-term storage of LIQUID MANURE, SLURRY, DIRTY WATER etc.
RECEPTION PIT	A PIT that is used for short-term storage of LIQUID MANURE, SLURRY, DIRTY WATER etc. from a livestock house prior to transferring to a main store.
TANK	A vessel for holding LIQUID MANURE, SLURRY, DIRTY WATER.
EFFLUENT TANK	A TANK usually used only for storing SILAGE EFFLUENT.
SETTLEMENT TANK	Usually a below-ground, rectangular vessel divided longitudinally into 2-3 compartments and used, for example, to aid settlement of solid material in DIRTY WATER prior to IRRIGATION. Can be a part of a TREATMENT design to separate SLUDGE and SUPERNATANT by gravity. The latter is sometimes used for irrigation or for flushing PASSAGEWAYS in houses or CHANNELS under SLATTED FLOORS.
ABOVE GROUND CIRCULAR TANK, SLURRY SILO.	A large, normally open-top, circular vessel made from prefabricated vitreous enamelled steel, concrete or wood panels used for storing LIQUID MANURE, SLURRY, DIRTY WATER etc. Filled and emptied from RECEPTION PIT using a pump.
LAGOON	Normally a large rectangular or square shaped structure with sloping earth bank walls (EARTH BANKED LAGOON) with large surface area to depth ratio. May be lined with water impermeable material. Used for storing LIQUID MANURES, SLURRY. Emptied with a pump or by mechanised digger. In the USA, and in other warm climates, LAGOONS are designed for biological TREATMENT and not just for storage. It can be AEROBIC, ANAEROBIC or facultative depending on design, loading rate and type of microorganism present.
MANURE STORAGE POND	LAGOON (not designed for MANURE TREATMENT in USA)
EARTH BANKED LAGOON	LAGOON
EARTHEN STORAGE BASIN	EARTH BANKED LAGOON (in USA) not designed for treatment.

STRAINER BOX	<p>A strong, coarse sieve fitted in LAGOONS that holds back solid material whilst allowing liquids (LIQUID FRACTION) to pass through. Liquid is pumped from the box at intervals leaving SOLID MANURE in the LAGOON that can be dug out.</p> <p>Strainer box can be a welded steel mesh cage or a box made from timber railway sleepers with horizontal slots. Mainly used in the UK.</p>
SLURRY COMPOUND	<p>A rectangular or square-shaped structure often with a concrete floor and walls manufactured from timber railway sleepers or concrete staves etc. It may be filled by scraping SLURRY up a ramp. A LIQUID FRACTION seeps through small, horizontal gaps in the walls and is collected in a gutter draining to a separate PIT. Mainly used in the UK.</p>
STORE COVERS	<p>Structures fitted to above ground LIQUID MANURE or SLURRY stores mainly to reduce AMMONIA EMISSIONS but also to exclude rainwater. These include:</p> <ul style="list-style-type: none"> • <i>Roof</i> of concrete, wood or corrugated metal, for example, usually supported on poles at the periphery of the store. Other types of covers, made from plastic, wood or concrete etc., are usually supported by the walls of the store. Some types are designed to float on the SLURRY. Common types include: • <i>Tent</i>. A reinforced plastic sheet attached to the rim of an ABOVE GROUND CIRCULAR store and supported by a central pole. • <i>Floating sheet</i>. A reinforced plastic sheet, sometimes incorporating floats of e.g. polystyrene used for both ABOVE GROUND CIRCULAR STORES and LAGOONS. The sheet may either : <ul style="list-style-type: none"> a) be attached to the rim of the store and large enough to account for the rise and fall in the level of SLURRY in the store or, b) float freely on the surface, sometimes supported by floats or sliding up and down vertical poles at the inner wall of an ABOVE GROUND STORE.
POSITIVE DISPLACEMENT PUMP	<p>A pumping mechanism that seals liquid in a chamber, then forces it out by reducing the volume of the chamber. Examples: piston, diaphragm, helical rotor, vane. Used for low volume and high lift. Contrast with centrifugal. Includes volumetric pump and force pump.</p>
CENTRIFUGAL PUMP	<p>A pumping mechanism that spins liquid in order to push it out by means of centrifugal force.</p>
CHOPPER PUMP	<p>A pump with the added feature of a cutting or shredding action to reduce suspended trash to pumpable size.</p>

SUBMERSIBLE PUMP	A motor/pump combination designed to be placed entirely below the surface of the liquid to be pumped.
VACUUM PUMP	A pump that removes air from a container to create a vacuum. Force pumps of many types are used for vacuum pumps including rotary pumps and piston pumps.
AGITATION	<p>The process of MIXING the contents of a SLURRY (or LIQUID MANURE) store to break up a hard CRUST and stir in any sediment to obtain a more homogeneous material. This is often done prior to pumping out the store and spreading on land. This can be done by:</p> <ul style="list-style-type: none"> • <i>Pump</i>. SLURRY is recycled through the RECEPTION PIT and ABOVE GROUND STORE by means of a suitable pump. The pump is sometimes also used to force a stream of slurry through a nozzle on to the surface of the stored SLURRY to help to break up the CRUST. Alternatively, smaller stores may be mixed by a SUBMERSIBLE CHOPPER PUMP. • <i>Propeller or rotating impeller</i>. These may be a) permanently fixed in the wall of an above ground store or, b), be mobile. Both types may be powered by an electric motor or by the power take off (PTO) of a tractor. Mobile types are usually mounted on long shafts to give access to SLURRY in a high-sided store or a LAGOON. • <i>Bubblers</i>. An air compressor is used to force air through perforations or nozzles in pipes fixed to the floor of ABOVE GROUND STORES. The streams of large bubbles that are generated serve to mix the contents of the store.

Solid manure stores

SOLID MANURE STORE	Normally a three sided, rectangular or square structure with a concrete floor and reinforced concrete or timber walls. The floor slopes towards the open side where seepage/drainage (LIQUID FRACTION) from the stacked SOLID MANURE is collected in a gutter and stored separately. In some countries, e.g. Alpine countries, SOLID MANURE stores are very common on farms with TIED HOUSING and daily removal of SOLID MANURE. These stores normally do not have any walls and are mostly not sloped.
FIELD HEAP	A heap or stack of SOLID MANURE stored in a field prior to spreading.
MIDDEN	A colloquial term for a MANURE heap, usually SOLID MANURE.

MANURE PAD	An area with a suitably tough surface e.g. concrete on which SOLID MANURE is stacked for storage or COMPOSTING.
MANURE BAG.	Large, prefabricated bags made from flexible, reinforced plastic sheet for storing LIQUID MANURE, SLURRY etc. The bag is sealed but ventilation is provided to prevent build up of gases.
MANURE CELLAR	A compartment for storage of MANURE underneath a livestock house. Steeply sloping terrain e.g. as in Norway provides suitable conditions for constructing this type of store. Ventilation is provided to prevent gases from entering the livestock house.
MANURE BUNKER	A high-sided container for storing dried LAYER MANURE.
WEEPING WALL STORE	A rectangular or square shaped structure made from specially designed concrete panels with vertical slots between them to allow liquid (LIQUID FRACTION) to seep out to a gutter draining to a PIT. SOLID MANURE is left in the STORE and is dug out by removing a section of the wall. Only suitable for SLURRY containing straw or SEMI-SOLID MANURE. Mainly used in the UK.
CRUST, NATURAL CRUST	A fibrous floating layer that forms on the surface of stored slurry, especially CATTLE SLURRY.
ARTIFICIAL CRUST	A floating layer on the surface of stored SLURRY or LIQUID MANURE produced by the addition of a suitable material such as straw, balls of light expanded clay aggregate (LECA), peat, oil, wool etc. Artificial crusts are produced to reduce AMMONIA EMISSIONS from the store.
FORE-END LOADER	A large shovel or bucket mounted on loading arms at the front of a tractor used for handling SOLID MANURE. The bucket may have a few short spikes with a back plate or may consist of many long spikes with a back plate.
FORE-END FORK	An array of large spikes mounted on arms at the front of a tractor used for handling SOLID MANURE.

MANURE TREATMENT

General terms on manure treatment

TREATMENT	A controlled biological, chemical or physical process that changes the properties of MANURES. Most types of treatment require investment in plant, machinery and operating costs. The benefits depend upon the type of treatment and the parameters (e.g. temperature) under which it is operated and controlled.
PROCESSING	TREATMENT
AEROBIC	Containing free oxygen or requiring free oxygen e.g. AEROBIC BACTERIA.
ANAEROBIC	Containing no free oxygen (or not requiring free oxygen such as ANAEROBIC BACTERIA) or chemically bound oxygen such as nitrates (NO ₃).
ANOXIC	Containing no free oxygen but possibly chemically bound oxygen such as nitrates (NO ₃).
PSYCROPHILIC	Process operated at low temperature (below 20 °C)
MESOPHILIC	Process operated in a temperature range of. 20 to 40°C.
THERMOPHILIC	Process operated above 40 °C.
REACTOR	A vessel in which TREATMENT or PROCESSING occurs.
CONTINUOUS REACTOR	A REACTOR that receives a more or less continuous flow of substrate (e.g. SLURRY) for TREATMENT.
BATCH REACTOR	A reactor that receives a discontinuous flow of substrate (e.g. SLURRY) for TREATMENT.
RETENTION TIME	The time for which a substrate e.g. SLURRY is retained in a treatment vessel or REACTOR.
RESIDENCE TIME	RETENTION TIME
DETENTION TIME	RETENTION TIME for ANAEROBIC DIGESTION.
SANITATION	Action by which pathogenic micro-organisms are killed by heating and/or addition of chemicals or irradiation.
HYGIENISATION	SANITATION
PASTEURISATION	Partial sterilisation by heating.

ADDITIVES	<p>Manufactured or naturally occurring products or substances that are added to MANURES to modify their biological, chemical or physical properties. Many additives are commercially available but most have not been subjected to independent testing so their effectiveness is uncertain. They include:</p> <ul style="list-style-type: none"> • BACTERIAL ENZYME PREPARATIONS. • PLANT EXTRACTS. • OXIDISING AGENTS. • DISINFECTANTS. • UREASE INHIBITORS. • MASKING AGENTS. • ACID, ACIDIFYING COMPOUNDS. • ADSORBENTS.
BACTERIAL ENZYME PREPARATIONS	Type of ADDITIVE. Many claims are made concerning their effectiveness including breakdown of CRUSTS, ODOUR reduction and stabilisation of LIQUID MANURES.
PLANT EXTRACTS	Type of ADDITIVE. Some are claimed to reduce ODOUR and AMMONIA EMISSIONS.
OXIDISING AGENTS	Type of ADDITIVE. These are intended to have a similar effect as AEROBIC TREATMENT.
DISINFECTANTS	Type of ADDITIVE. These are intended to have a SANITATION effect for LIQUID MANURES.
UREASE INHIBITORS	Type of ADDITIVE. These block the transformation of urea, that is contained in the urine of livestock, to AMMONIUM compounds. The latter breakdown to release AMMONIA gas, so UREASE INHIBITORS have potential for reducing AMMONIA EMISSION from MANURES.
NITRIFICATION INHIBITORS	Substances that stop or delay the process of NITRIFICATION, the transformation of ammonium nitrogen to nitrates.
MASKING AGENTS	Type of ADDITIVE. These are intended to reduce offensive ODOUR by replacing, or masking, them with a more pleasant ODOUR.
ACID	Type of ADDITIVE. Under acidic conditions (pH 4-5), AMMONIUM nitrogen remains in solution rather than being released into the air as AMMONIA gas. Hence, reducing the pH of LIQUID MANURE by adding acid can reduce the potential for AMMONIA EMISSION.
ACIDIFYING COMPOUNDS	Type of ADDITIVE. ACID or chemical compounds that decrease the pH of e.g. LIQUID MANURES.

ADSORBENTS Type of ADDITIVE. These include substances such as peat and clay minerals (e.g. ZEOLITE) that depend upon physical adsorption (e.g. of odorous compounds, AMMONIA) for their effect.

ZEOLITE A clay mineral with a high adsorptive capacity used as an ADDITIVE.

Liquid manure treatment

AEROBIC TREATMENT The breakdown of organic matter in the presence of free oxygen. Treatment involves dissolving sufficient oxygen in LIQUID MANURES (through AERATION) to stimulate growth of aerobic bacteria. The potential benefits include:

- Stabilisation of the manure and reduction in BIOLOGICAL OXYGEN DEMAND (BOD) and CHEMICAL OXYGEN DEMAND (COD).
- Decrease in PATHOGENS.
- Reduction in ODOUR.
- More homogeneous MANURE that is easier to pump.

COMPOSTING of SOLID MANURES is a type of AEROBIC TREATMENT.

AERATION The process of incorporating air into LIQUID (or SOLID MANURE) in order to achieve AEROBIC TREATMENT. There is a range of methods available including AERATORS, specially designed LAGOONS for LIQUID MAURE and mechanically turning or mixing SOLID MANURE.

LIQUID COMPOSTING Sometimes refers to AEROBIC TREATMENT of LIQUID MANURE designed and operated to generate and recover heat.

ACTIVATED SLUDGE PROCESS LIQUID MANURE or ORGANIC WASTE is agitated and AERATED and the solids separated by sedimentation. The mass of settled solids is termed *active sludge*.

OXYGEN TRANSFER EFFICIENCY The efficiency with which oxygen is transferred into a liquid e.g. SLURRY by an AERATOR. Normally measured as kilograms of oxygen per absorbed kilowatt hour of power (kgO_2/kWh) by the AERATOR.

OVERALL SPECIFIC OXYGEN INPUT (OSOI) OXYGEN TRANSFER EFFICIENCY.

AERATOR	<p>A mechanical device used for transferring and diffusing oxygen (AERATING) into a liquid e.g. SLURRY. There are many different types of AERATOR that vary in cost, OXYGEN TRANSFER EFFICIENCY, application and reliability. They include:</p> <ul style="list-style-type: none">• <i>Surface aerators</i>• <i>Air injection systems</i>• <i>Pump based systems</i>
AEROBIC LAGOON	<p>LAGOONS containing LIQUID MANURE that are either mechanically aerated with an AERATOR or designed to be shallow and naturally AEROBIC.</p>
OXIDATION DITCH	<p>An artificial open CHANNEL for partial TREATMENT of liquid MANURE or wastes in which the liquid is circulated and aerated by a mechanical device.</p>
FLOCCULATION	<p>Part of a TREATMENT process where addition of chemicals and mixing causes agglomeration of small suspended particles into <i>flocs</i> that can be removed by sedimentation, filtration or floatation.</p>
ANAEROBIC DIGESTION	<p>The breakdown of organic matter by microorganisms in the absence of free oxygen. It is a process that occurs naturally in surface waters, soils, LAGOONS and in closed slurry tanks, for example, when no oxygen is present. The process can be used for the TREATMENT of LIQUID MANURES and for organic wastes such as municipal sewage and food industry wastes. The efficiency of the process is very dependant upon operating temperature. Most industrial and farm DIGESTERS are operated in the MESOPHILIC range where significant investment in machinery, plant and operating cost is required. The benefits of the process include:</p> <ul style="list-style-type: none">• Stabilisation of manure and reduction in BOD and COD.• Reduction in ODOUR.• SANITATION of MANURE and decrease in PATHOGENS.• More homogeneous manure that is easier to manage and pump.• Production of BIOGAS.
PSYCROPHILIC DIGESTION	<p>Slow ANAEROBIC DIGESTION of LIQUID MANURE such as SLURRY in a LAGOON under ambient temperature conditions. The LAGOON may be covered to retain heat and collect BIOGAS. Most suitable to areas with a warmer climate.</p>

MESOPHILIC DIGESTION	ANAEROBIC DIGESTION operated at a temperature of, typically, about 35° C. LIQUID MANURE or SLURRY is mixed and heated in an air-tight, insulated REACTOR or DIGESTER with a RETENTION TIME of 10-20 days. BIOGAS is collected and may be burnt in a boiler to provide hot water, e.g. for heating the DIGESTER, an engine or COMBINED HEAT AND POWER UNIT (CHP).
BIOGAS	A mixture of the gases METHANE and carbon dioxide, with smaller concentrations of other gases, produced from the ANAEROBIC DIGESTION of LIQUID MANURES etc.
DIGESTER	A vessel or REACTOR in which LIQUID MANURE etc. undergoes ANAEROBIC DIGESTION.
COMBINED HEAT AND POWER UNIT (CHP)	An internal combustion engine coupled to an electricity generator. Modified to run on BIOGAS, a CHP yields heat, through recovery from the engine cooling system, and electricity.
CO-GENERATION UNIT	COMBINED HEAT AND POWER UNIT.
CO-DIGESTION	ANAEROBIC DIGESTION of more than one type of organic substrate in the same DIGESTER.
CENTRALISED DIGESTER	An ANAEROBIC DIGESTION plant designed to receive organic substrates from several sources (e.g. SLURRIES from neighbouring farms, wastes from abattoirs, food processing factories etc.), so offering economies of scale in investment and operating costs. Also, BIOGAS production can be improved compared to digesting only SLURRY.
CAD PLANT	CENTRALISED DIGESTER
METHANISATION	The conversion of VOLATILE FATTY ACIDS contained in, for example LIQUID MANURES, to METHANE and carbon dioxide gases by bacteria during ANAEROBIC DIGESTION.
FERMENTATION	The breakdown of organic substances under ANAEROBIC conditions by the action of ENZYMES secreted by living organisms such as bacteria and yeasts. The processes involved in SILAGE making and in ANAEROBIC DIGESTION are examples of FERMENTATION.

MECHANICAL SEPARATION	The mechanical separation of coarse, fibrous material from LIQUID MANURE, especially SLURRY, to produce a more free-flowing LIQUID FRACTION and a stackable SOLID FRACTION. The products are easier to manage than SLURRY. The LIQUID FRACTION requires less power for pumping through pipes, for mixing and for AERATION and is less likely to form a CRUST or sediment during storage. There is also an improvement in FERTILISER VALUE. The SOLID FRACTION can be COMPOSTED and managed as SOLID MANURE.
MECHANICAL SEPARATOR	A machine for the MECHANICAL SEPARATION of SLURRY. There are several different types of machine with different principles of operation that produce LIQUID and SOLID FRACTIONS with different DRY MATTER CONTENTS. They include: <ul style="list-style-type: none"> • <i>Sieves</i>. These types comprise a perforated metal or plastic screen or mesh through which the LIQUID FRACTION separates through gravity sometime aided by the application of pressure by rollers, for example. These include <i>rotating drum, vibrating screen, inclined screen, roller press</i> and <i>belt press</i> machines. • <i>Centrifuges</i>. These rely on rapid rotation creating sufficient centrifugal force to separate out a LIQUID FRACTION. • <i>Screw press/press auger</i>. A screw or auger with a continuous flight rotates inside a cylindrical metal tube so squeezing out a LIQUID FRACTION and discharging a SOLID FRACTION at the end of the tube.
OLIGOLYSIS	A small electric current is passed between two electrodes in stored LIQUID MANURE so releasing ions, usually copper, into the manure. The process is claimed to have a bactericidal effect, to reduce CRUST, SEDIMENT and ODOUR formation. With copper electrodes, it can significantly increase the copper content of the LIQUID MANURE.
SOIL TREATMENT	The treatment (e.g. removal of BOD and some PLANT NUTRIENTS) by percolation of liquid through a suitable free-draining soil (e.g. <i>Solepur Process</i>), or by overland flow on more impermeable soils.
CONSTRUCTED WETLANDS	A constructed, semi-natural area of land typically comprising beds of specialised plant such as reeds (<i>Phragmites spp</i>) and gravel filled channels. They have potential for the treatment (e.g. removal of BOD and PLANT NUTRIENTS) from dilute farm EFFLUENTS such as PARLOUR WASHINGS.

Solid manure treatment

COMPOSTING	<p>This normally refers to the breakdown of SOLID MANURES in the presence of free oxygen i.e. under AEROBIC conditions. This can be achieved by mechanically turning or mixing a heap or pile with a tractor FORE-END LOADER, for example, to incorporate air or by more specialised equipment. The potential benefits of COMPOSTING are:</p> <ul style="list-style-type: none"> • Reduction in mass of MANURE. • Improved friability and handling characteristics. • Kill of weed seeds and decrease in PATHOGENS through generation of heat. • Reduction in ODOUR. • Concentration of PLANT NUTRIENTS. <p>During COMPOSTING, inorganic nitrogen is converted to organic forms and some is lost through VOLATILISATION.</p>
COMPOST	SOLID MANURE after COMPOSTING. The term is also used to denote mixtures of e.g. peat, soil etc for growing plants or the product from COMPOSTING other vegetable or plant residues or ORGANIC WASTES.
WINDROW	A long heap (typically 1 to 3 metres high, 2 to 5 metres wide and of indeterminate length) of SOLID MANURE, usually undergoing COMPOSTING.
TURNING MACHINE	A machine designed to turn and mix SOLID MANURE to encourage COMPOSTING often in WINDROWS.
IN-VESSEL COMPOSTING	COMPOSTING in a COMPOST REACTOR as opposed to a WINDROW.
CO-COMPOSTING	The COMPOSTING of a mixture of different organic substrates together.
FORCED AERATION	COMPOSTING through the use of perforated pipes or a porous floor to force air into the SOLID MANURE or other organic material.
AERATED STATIC PILE	FORCED or PASSIVE AERATION.
PASSIVE AERATION	COMPOSTING through the use of open-ended perforated pipes or a porous floor at the base of the composting material for convective movement of air into the SOLID MANURE or other organic material.
COMPOST REACTOR	A closed, aerated vessel for rapidly COMPOSTING organic substrates such as SOLID MANURES and producing a high quality COMPOST.

THERMAL PROCESSING, DRYING	This process involves heating SOLID MANURE to drive off moisture so yielding a lower volume or weigh of dried, stable and sterilised MANURE. Running costs can be very high, and the process is most suitable for MANURES with an initially high dry matter content such as POULTRY manure and by recycling warm exhaust air from ANIMAL HOUSES.
VERMICOMPOSTING	The process by which SOLID MANURES or ORGANIC WASTES are broken down through the action of earthworms, a slower, lower temperature process than THERMOPHILIC COMPOSTING.
VERMICULTURE	VERMICOMPOSTING

APPLICATION TO LAND

General terms on manure application

APPLICATION	The distribution of MANURE on to land by any method.
APPLICATION RATE	Normally refers to the mass (tonnes, t) or volume (cubic metres, m ³) of MANURE applied per unit area (e.g. hectare, ha) of land.
APPLICATION TIME	Normally refers to the season or month of application to land.
APPLICATOR	A device for distributing MANURE or FERTILISER on to land.
BROADCAST	MANURE is spread over the whole surface of an area of land (compare with PLACEMENT, BANDSPREADING).
SPREADING	The distribution of MANURE over a surface, normally as BROADCAST, using e.g. a MANURE or SLURRY SPREADER.
LANDSPREADING	The distribution of MANURE on to land.
SPREADING WIDTH	The width of spread by one pass of a LIQUID or SOLID MANURE SPREADER.
WORKING WIDTH	The distance between the centres of two adjacent SPREADING WIDTHS.
BOUT WIDTH	WORKING WIDTH.

Application of liquid manure

SLURRY TANKER	A metal vessel, normally cylindrical with a circular or elliptical cross-section, mounted on wheels for transporting or spreading LIQUID MANURE.
TANKER	SLURRY TANKER
SELF-PROPELLED TANKER	A TANKER with a built in tractor unit. May be designed to transport over relatively short distances and spread LIQUID MANURE on land.
ROAD TANKER	A TANKER built on a chassis complete with engine and cab suitable for transporting LIQUID MANURE on public roads.
TRACTOR-DRAWN TANKER	A TANKER with no independent motor unit but with a tow-bar for towing by a tractor. Most commonly used in the application of LIQUID MANURE to land.

TOWED TANKER	TRACTOR-DRAWN TANKER
VACUUM TANKER	A TANKER equipped with a VACUUM PUMP used to evacuate air from the tanker to create a vacuum to suck in LIQUID MANURE. The tanker is pressurised by the pump to force the manure out, commonly onto a SPLASH PLATE.
PUMPED TANKER	LIQUID MANURE is pumped into and out of the tanker using a built in POSITIVE DISPLACEMENT PUMP. Some TANKERS fitted with a CENTRIFUGAL PUMP only pump manure out and must be filled with a separate pump.
SPLASH PLATE	A spreading device for LIQUID MANURE in which the MANURE is forced under pressure through a nozzle on to an inclined plate to increase the area over which it is distributed in “fan” fashion (see BROADCAST). Often mounted at the rear of TANKERS.
UMBILICAL SYSTEM	LIQUID MANURE is fed through a long hose to an APPLICATOR fitted directly on the rear of a tractor. The hose is supplied with LIQUID MANURE direct from the store or from a NURSE or BUFFER TANK or store in the field by a pump.
UMBILICAL HOSE SYSTEM	UMBILICAL SYSTEM
NURSE TANK	A vessel for short-term storage of LIQUID MANURE prior to APPLICATION to LAND. Often sited in a field close to where LIQUID MANURE is to be applied.
BUFFER TANK	NURSE TANK
IRRIGATION	<p>The APPLICATION of liquid through pipes, commonly, underground, leading to a length of flexible pipe on the surface connected to an IRRIGATOR. IRRIGATORS may be</p> <ul style="list-style-type: none"> • <i>Static</i> (e.g. a sprinkler or rain gun) and have to be moved manually to different parts of the field. • <i>Mobile</i> or <i>travelling</i> that are self-propelled and normally travel in pre-set lines across the field. <p>For both types, the liquid is forced through nozzles that are designed to rotate or oscillate to distribute the liquid as relatively small droplets over a wide area. Travelling systems can be equipped with specific designed application boom. IRRIGATION is suitable only for MANURES that can be pumped through long lengths of pipe and discharged through small nozzles without causing blockages e.g. water, dilute SLURRY, LIQUID FRACTION, DIRTY WATER.</p>
IRRIGATOR	Device for the APPLICATION of e.g. LIQUID MANURE to land by IRRIGATION.

BAND SPREADING	The APPLICATION of LIQUID MANURE to the land surface in parallel bands with no MANURE between the bands using a BAND SPREADER. Used mainly to reduce AMMONIA EMISSIONS. Also reduces ODOUR.
BAND SPREADER	A machine for the APPLICATION of LIQUID MANURE to the land surface in parallel bands with no MANURE between the bands. BAND SPREADERS may be mounted at the rear of a TANKER or at the rear of a tractor (UMBILICAL SYSTEM). LIQUID MANURE (most commonly SLURRY) is fed to a rotary distributor that serves to chop and homogenise the MANURE and proportion it evenly to a series of hoses for distribution on to the ground. Used mainly to reduce AMMONIA EMISSIONS. Also reduces ODOUR.
TRAILING HOSES	A type of BAND SPREADER. It may, for example, comprise a boom that supports a number of hoses that distribute LIQUID MANURE close to the ground e.g. between the rows of a growing crop. Used mainly to reduce AMMONIA EMISSIONS. Also reduces ODOUR.
TRAILING SHOES	A type of BAND SPREADER comprising an array of TRAILING SHOE UNITS that are designed to part crop or grass leaves and stems and place LIQUID MANURE in bands on the soil surface. Used mainly to reduce AMMONIA EMISSIONS. Also reduces ODOUR.
TRAILING FOOT (FEET)	TRAILING SHOE
SLEIGH FOOT (FEET)	TRAILING SHOE
INJECTION	The APPLICATION of LIQUID MANURE by placement in slots cut into the soil, mainly to reduce AMMONIA EMISSIONS. Also reduces ODOUR.
SHALLOW INJECTION	The APPLICATION of LIQUID MANURE by placement in shallow, vertical slots, typically about 50mm deep, cut into the soil by a tine or disc. Used mainly to reduce AMMONIA EMISSIONS. Also reduces ODOUR.
DEEP INJECTION	The APPLICATION of LIQUID MANURE by placement in deep, vertical slots, typically about 150mm deep, cut into the soil by specially designed tines. DEEP INJECTION tines are often fitted with lateral wings to increase the lateral dispersion of MANURE into the soil. Used mainly to reduce AMMONIA EMISSIONS. Also reduces ODOUR.

SOD INJECTION	The APPLICATION of LIQUID MANURE by placement in bands with a slit cut into the soil beneath the bands. Used mainly to reduce AMMONIA EMISSIONS. Also reduces ODOUR.
ARABLE INJECTION	The APPLICATION of LIQUID MANURE on arable land using an INJECTOR, mainly to reduce AMMONIA EMISSIONS.
GRASSLAND INJECTION	The APPLICATION of LIQUID MANURE into grassland using an INJECTOR, mainly to reduce AMMONIA EMISSIONS. Also reduces ODOUR.
INJECTOR	A machine for the INJECTION of LIQUID MANURE into soil. These normally comprise an array of injector units mounted on a TANKER or at the rear of a tractor (UMBILICAL SYSTEM). LIQUID MANURE is normally fed from the TANKER or UMBILICAL HOSE to a rotary distributor that serves to chop and homogenize the MANURE and to proportion it evenly to hoses attached to each INJECTION UNIT. May be shallow INJECTOR or deep INJECTOR etc. Used mainly to reduce AMMONIA EMISSIONS. Also reduces ODOUR.
ARABLE INJECTOR	A machine comprising spring or rigid tines with pipes attached and mounted on a tractor or TANKER for INJECTION of LIQUID MANURE into cultivated land. Used mainly to reduce AMMONIA EMISSIONS. Also reduces ODOUR.
OPEN-SLOT INJECTOR	A type of INJECTOR where the slots cut in the soil are left open after filling with LIQUID MANURE. Used mainly to reduce AMMONIA EMISSIONS. Also reduces ODOUR.
CLOSED-SLOT INJECTOR.	A type of INJECTOR where the slots cut in the soil are closed up after filling with LIQUID MANURE e.g. by press wheels. Used mainly to reduce AMMONIA EMISSIONS. Also reduces ODOUR.
PRESSURISED INJECTOR	A type of INJECTOR where LIQUID MANURE is forced into the soil under pressure e.g. of 5-8 bar. Used mainly to reduce AMMONIA EMISSIONS. Also reduces ODOUR.

Application of solid manure

SOLID MANURE SPREADER A machine for the APPLICATION of SOLID MANURE to land.

SIDE-DISCHARGE SPREADER A machine for the APPLICATION of SOLID MANURE and designed to throw the manure out from the side of the machine. This may be achieved by:

- An open-top machine with rotating impellers or blades to which manure is delivered by AUGER or CONVEYOR.
- An open-sided machine with spinning flails or chains mounted on a rotating shaft running along its length.

REAR-DISCHARGE SPREADER A machine for the APPLICATION of SOLID MANURE to land designed to throw manure out from the rear of the machine. This may be achieved by:

- Beaters that rotate horizontally or vertically
- Spinning discs
- A combination of beaters and spinning discs.

Manure is delivered to the beaters or spinning discs at the rear of the machine by CONVEYOR (or moving floor) or AUGER at the base of the machine.

DUAL PURPOSE SPREADER SOLID MANURE SPREADER that can be adjusted, usually through varying the aperture of the outlet adjacent to the distributor mechanism, to spread either SOLID or LIQUID MANURE.

FERTILISER AND CROP TERMS

Fertilisers

FERTILISER	Any natural or manufactured material applied to the soil in order to supply one or more PLANT NUTRIENTS. The term is generally applied largely to inorganic materials that are available commercially.
MINERAL FERTILISER	FERTILISER manufactured by a chemical process or mined as opposed to organic material that contains carbon.
CHEMICAL FERTILISER	MINERAL FERTILISER
ARTIFICIAL FERTILISER	MINERAL FERTILISER
BAG FERTILISER	Colloquial term for MINERAL FERTILISER
PURCHASED FERTILISER	Any fertiliser that is bought. Usually refers to MINERAL FERTILISER
COMMERCIAL FERTILISER	PURCHASED FERTILISER
COMPOUND FERTILISER	A FERTILISER containing a mixture of two or three of the major PLANT NUTRIENTS (nitrogen, phosphorus and potassium), usually in proportions to suit particular crop requirements.
MULTI-NUTRIENT FERTILISER	COMPOUND FERTILISER
STRAIGHT FERTILISER	A FERTILISER containing only one chemical ingredient, usually providing one, but sometimes two, of the major PLANT NUTRIENTS (nitrogen, phosphorus or potassium).
ORGANIC FERTILISER	A FERTILISER derived from organic origin such as animal products (e.g. LIVESTOCK MANURE, dried blood, hoof and bone meal), plant residues or human origin (e.g. SEWAGE SLUDGE).
ORGANIC MINERAL FERTILISER	A FERTILISER containing PLANT NUTRIENTS in both organic and inorganic form.
ORGANO-MINERAL FERTILISER	ORGANIC MINERAL FERTILISER

Chemical terms and manure composition

DRY MATTER (DM)	The residue remaining following heating under standard conditions (usually around 105 °C to constant weight) to drive off water. Often expressed as a percentage of the weight of original material.
FRESH MATTER (FM)	Unmodified, wet, undried material.
ORGANIC MATTER (OM)	Residues derived from plants, animals and micro-organisms in various stages of decomposition.
PLANT NUTRIENTS	Elements needed for normal plant growth. Usually divided into macronutrients (nitrogen, phosphorus, potassium, magnesium, calcium, sulphur) and MICRONUTRIENTS (e.g. copper, zinc, manganese etc.)
MACRONUTRIENT	Chemical element needed by crops in relatively large amounts. Usually refers to nitrogen (N), phosphorous (P), potassium (K) and sulphur (S).
TRACE ELEMENT	A chemical element that is required in very small quantities by plants or animals for normal functioning, growth and health. Include iron, zinc, boron, copper, manganese, cobalt and molybdenum.
MICRONUTRIENTS	TRACE ELEMENT
HEAVY METALS	A group of metallic elements that include lead, cadmium, zinc, copper, mercury and nickel. Can be found in considerable concentrations in SEWAGE SLUDGE and several other waste materials. High concentrations in the soil can lead to toxic effects in plants, animals and humans ingesting plants or soil particles.
TOTAL KJELDAHL NITROGEN (TKN)	Total amount of organic and reduced forms of nitrogen contained in e.g. LIVESTOCK MANURES, excluding NITRATES (NO ₃).
TOTAL AMMONIACAL NITROGEN (TAN)	The total amount of ammonium and AMMONIA nitrogen contained in e.g. LIVESTOCK MANURES.
NH ₃	Ammonia
NH ₄ ⁺	Ammonium
NO ₃	Nitrate
N ₂ O	Nitrous oxide

NO	Nitric oxide
NO _x	Nitrogen oxides usually N ₂ O, NO)
P ₂ O ₅	Phosphate
K ₂ O	Potash, oxide of potassium (K)
O ₂	Oxygen gas
N ₂	Nitrogen gas
C	Carbon
CO ₂	Carbon dioxide
CH ₄	Methane
S	Sulphur
C:N RATIO	The amount of total carbon divided by the amount of total nitrogen contained e.g. in LIVESTOCK MANURE etc. MANURES with a high C:N RATIO such as FARMYARD MANURE usually take longer to break down, or MINERALISE, in the soil than those such as SLURRY with a lower C:N RATIO.
pH	A measure of the hydrogen ion concentration of a solution and an indication of its` acidity or alkalinity. Expressed on a scale from 0 to 14, 7 is neutral, higher values more alkaline, lower values more acid.
TOTAL SOLIDS (TS)	DRY MATTER
TOTAL SUSPENDED SOLIDS (TSS)	Total suspended matter in liquid, which is commonly expressed as a concentration in terms of milligrams per unit volume or weight. Normally determined by collection of solids on a filter paper.
SUSPENDED SOLIDS (SS)	Suspended matter in liquid.
TOTAL VOLATILE SOLIDS (TVS)	The weight loss after a sample of TOTAL SOLIDS is ignited in a furnace (heated to dryness at 550°C).
VOLATILE SOLIDS	TOTAL VOLATILE SOLIDS
VOLATILE SUSPENDED SOLIDS (VSS)	The weight loss after a sample of SUSPENDED SOLIDS is ignited in a furnace (heated to dryness at 550 °C).

ASH	Product remaining after incineration in laboratory combustion.
VOLATILE ORGANIC COMPOUND (VOC)	Organic chemicals that have a high vapour pressure and easily form vapours at normal temperature and pressure.
VOLATILE FATTY ACID (VFA)	Short chain fatty acids containing two to five carbon atoms that are produced as end products of microbial FERMENTATION in the digestive tract.
VISCOSITY	Resistance of a fluid to a change in shape, or movement of neighbouring portions relative to one another. Viscosity denotes opposition to flow. The reciprocal of the viscosity is called the FLUIDITY.
FLUIDITY	Measure of the ease of flow of a fluid e.g. SLURRY using special apparatus.
BULK DENSITY	Mass per unit volume for soil or MANURE or other substances.
BIOLOGICAL OXYGEN DEMAND (BOD)	Together with the COD, BOD is the measure of the pollution potential in water bodies and organic wastes. A laboratory test is used to measure the amount of dissolved oxygen consumed by chemical and biological action when a sample is incubated at 20 C° for a given number of days.
BIOCHEMICAL OXYGEN DEMAND (BOD)	BIOLOGICAL OXYGEN DEMAND
CHEMICAL OXYGEN DEMAND (COD)	A measure of the amount of oxygen consumed in the microbial oxidation of decomposable and inert organic matter and the oxidation of reduced substances in water. The COD is always higher than the BOD, but measurements can be made in a few hours while BOD measurements take five days.
RAPID ANALYSIS TECHNIQUE	This normally refers to methods for analysing manures, most commonly for nitrogen content, on farms without the need for a laboratory or laboratory apparatus.
ON-FARM ANALYSIS TECHNIQUE	RAPID ANALYSIS TECHNIQUE
REPRESENTATIVE SAMPLE	A sample (e.g. of LIQUID or SOLID MANURE) that is selected in such a way that its characteristics and properties are representative, or typical, of the bulk of material from which it was taken. .

Agronomy

FERTILISER EQUIVALENT	<p>This is a comparison between the crop yield from obtained from MANURE application and that from INORGANIC FERTILISER. The proportion of MANURE TOTAL NUTRIENT content equivalent to application of INORGANIC FERTILISER applied according to best practice. It takes into account the facts that</p> <ul style="list-style-type: none"> a) only a proportion of the nutrients contained in MANURES are in forms available for PLANT UPTAKE b) proportions of the nutrients in MANURES, especially nitrogen, may be lost (e.g. through AMMONIA VOLATILISATION or LEACHING) from the plant/soil system.
RESIDUAL EFFECTS	<p>The increase in yield, or nutrient content, of a second or subsequent crop after the application of ORGANIC FERTILISER (e.g. LIVESTOCK MANURE) that can be attributed to the initial application of organic fertiliser.</p>
CROP RESPONSE	<p>The increase in the yield of a crop arising from application of PLANT NUTRIENTS e.g. in FERTILISER or MANURE.</p>
PLANT UPTAKE	<p>The absorption of PLANT NUTRIENTS through the roots, or sometimes the leaves, of plants.</p>
FERTILISER REQUIREMENT	<p>The amounts of PLANT NUTRIENTS needed, in addition to those already contained in the soil, to obtain a desired, optimum crop yield.</p>
TOTAL NUTRIENT	<p>The total amount of a PLANT NUTRIENT contained in e.g. LIVESTOCK MANURE in both inorganic and organic forms</p>
PLANT AVAILABLE NUTRIENT	<p>The amount of a PLANT NUTRIENT contained in e.g. LIVESTOCK MANURE in chemical forms that can be, potentially, immediately taken up by plants.</p>
AVAILABLE NUTRIENT	<p>PLANT AVAILABLE NUTRIENT</p>
FERTILISER VALUE	<p>The value or worth of MANURE etc. (e.g. euros/m³) based on the cost of providing the same quantities of PLANT NUTRIENTS that it contains as INORGANIC FERTILISER. It should be stated whether this is based on TOTAL or AVAILABLE MANURE nutrient content.</p>

ENVIRONMENT

Nutrient balance and pollution

NUTRIENT BALANCE	<p>A comparison between PLANT NUTRIENT input and nutrient output or uptake. The nutrient balance can be expressed as:</p> <ul style="list-style-type: none"> • an import/export balance comparing the nutrients imported on to or exported from the farm or • as a supply/demand balance comparing the amount of nutrients entering crop and grassland production in form of MANURE or FERTILISERS and nutrients removed in products (including products not leaving the farm).
NUTRIENT SUPPLUS	<p>The amount of PLANT NUTRIENTS exceeding that required or taken up by crops, thus resulting in a positive NUTRIENT BALANCE.</p>
DIFFUSE POLLUTION	<p>Pollution of water, air or soil that can not be attributed to a stationary source of pollution (e.g. LEACHING, RUN-OFF or AMMONIA EMISSION from a field).</p>
POINT SOURCE POLLUTION	<p>Pollution or emission from a stationary source that can be clearly localised (livestock housing or manure store).</p>
PATHOGENS	<p>Microorganisms that can cause disease in humans, animals and plants. Pathogens include bacteria, viruses, and parasites and, in agriculture, can be found in MANURE, SEWAGE SLUDGE etc.</p>
COLIFORM BACTERIA	<p>A group of long-living bacteria mainly living in the intestine of warm blooded animals but also found in soils. Coliforms of faecal origin (e.g. <i>Escherichia coli</i>) are often used as an indicator of contamination or of the potential presence of pathogenic organisms.</p>

Processes

EMISSION	<p>The transfer, or release, of a gas e.g. AMMONIA from a terrestrial source, such as MANURE SPREADING, LIVESTOCK HOUSES etc. to the atmosphere.</p>
EMISSION FACTOR	<p>The rate of transfer, or release, of a gas e.g. AMMONIA from a specified source to the atmosphere e.g. kg/m³ MANURE applied to land or in storage. May also be expressed as a percentage e.g. % TOTAL AMMONIACAL NITROGEN or TOTAL NITROGEN or integrated over time e.g. kg/animal/year.</p>

IMMOBILISATION	Process whereby PLANT NUTRIENTS in inorganic form are converted to organic forms by incorporation into micro-organisms. These nutrients are then temporarily unavailable for PLANT UPTAKE.
DENITRIFICATION	The transformation, most commonly by bacteria, of NITRATES to NITROUS OXIDE and nitrogen gas. An ANAEROBIC process that occurs in soils and in MANURE STORES and in some TREATMENT methods, after a NITRIFICATION period.
NITRIFICATION	The transformation by bacteria of AMMONIUM nitrogen to nitrites and then to NITRATES. An AEROBIC process that may occur in soils and during AERATION of LIQUID MANURES.
MINERALISATION	The transformation by microorganisms of organic compounds to inorganic compounds e.g. in soils, stored MANURES.
AMMONIFICATION	Process by which some soil organisms, "ammonifiers", convert organic nitrogen, e.g. in soils, MANURES, to ammonium ions.
ACIDIFICATION	The process by which soil or surface waters become increasing acid (lower pH) e.g. through DEPOSITION of AMMONIA or sulphur dioxide or NO _x .
EUTROPHICATION	Process of NUTRIENT ENRICHMENT in water or, occasionally, soil, resulting in oxygen depletion in aquatic ecosystems, in loss of biodiversity etc.
NUTRIENT ENRICHMENT	An excess of nutrient input into an ecosystem, which in sensitive ecosystems results in EUTROPHICATION.
RUN-OFF	The flow of rainfall, irrigation water, liquid manure etc. over land. RUN-OFF can cause pollution by transporting pollutants e.g. in MANURES to surface waters.
OVERLAND FLOW	RUN-OFF
LEACHING	The loss of soluble elements and compounds from soil in drainage water to the aqueous environment including GROUND WATER. This applies especially to NITRATE LEACHING.
AMMONIA VOLATILISATION	The process by which AMMONIA gas is released from a solution
DEPOSITION	The transfer of a pollutant e.g. AMMONIA from the atmosphere to a terrestrial sink such as land, water or plants. <ul style="list-style-type: none"> • Dry DEPOSITION. DEPOSITION as a gas or particles. • Wet DEPOSITION. DEPOSITION in precipitation (rainfall, snow)

Soil

SOIL FERTILITY	Ability of the soil to store nutrients and supply them to plants according to their needs, to provide optimal soil, water and air conditions for plant growth and support optimal root growth and turn-over of organic substance through a high level of biological activity.
SOIL POROSITY	Measure of the amount of open space between soil and rock particles.
SOIL TEXTURE	Soil classification based on the type and proportion of particles (sand, silt, clay) that it contains.
SOIL COMPACTION	An increase in bulk density (mass per unit volume) and a decrease in SOIL POROSITY resulting from applied loads, vibration, or pressure. Soil compaction decreases the water holding capacity of the soil and the soil air content, it can impede plant growth and increases the risk of RUN-OFF and erosion.
SOIL EROSION	Wearing away and loss of topsoil, principally by wind and running water. Important pathway of phosphorus loss from land to surface water.
FIELD CAPACITY	The condition of the soil at which it holds maximum moisture against gravitational pull and any further water addition results in drainage.
SOIL MOISTURE DEFICIT	The amount of water that a soil requires to be added to return to FIELD CAPACITY.
WATTERLOGGED SOIL	A soil that is saturated with water so that the pores are completely filled with water
LAND DRAINAGE, FIELD DRAINAGE	The construction of drains in or under the field to remove surplus water from the land to a ditch.
ACCUMULATION OF NUTRIENTS AND HEAVY METALS	The build up of PLANT NUTRIENTS or HEAVY METALS in soil to excessively high concentrations.
PHOSPHORUS (P) SATURATED SOILS	Soils in which the retention capacity of phosphorus is exceeded, resulting in the potential for LEACHING of phosphorus.
BUFFER STRIP	A strip of grassland or other vegetation located between cultivated areas or fields to minimise RUN-OFF and soil erosion. Also used between fields and watercourses.

Water

GROUND WATER	Water that flows or seeps downward and saturates soil or rock, supplying springs and wells. The upper surface of the saturate zone is called the water table.
SURFACE WATER	Water that flows in streams and rivers and in natural lakes, in wetlands, and in reservoirs constructed by humans.
CATCHMENT	The area that drains the rainwater falling on it, via streams and rivers, eventually to the sea or into a lake. Separated from the adjacent catchment area by a ridge of high land or WATERSHED.
WATERSHED	The ridge of high ground or imaginary border line separating the CATCHMENT areas of two distinct river systems.
GROUND WATER TABLE	Water level of an unconfined aquifer, below which the pore spaces are generally saturated
NITRATE LEACHING	Transport of NITRATES (NO ₃) from soil in soil drainage water to the aqueous environment.
DISCHARGE STANDARD	Legal limit to be met when introducing an EFFLUENT into water.
EFFLUENT	Liquid e.g. from MANURE or SEWAGE TREATMENT or industrial processes. Often used to describe a liquid discharged into the environment, usually water, with permission and to appropriate standards or conditions. See also SILAGE EFFLUENT.
VULNERABLE ZONE	Generally used for "nitrate vulnerable zones" according to the EU nitrate directive 1991, in which nitrate pollution (from agricultural sources) exceeds, or is likely to exceed, the legal limit of 50 mgNO ₃ /litre.

Atmosphere

AMMONIA	NH ₃ . A gas derived from urea (uric acid) excreted by LIVESTOCK (POULTRY) and implicated in ACIDIFICATION and nitrogen enrichment of sensitive ecosystems.
GREENHOUSE GASES (GHG)	Gases that contribute to the "green house effect" and global warming. Include carbon dioxide, METHANE and NITROUS OXIDE.
NITROUS OXIDE	N ₂ O. A GREENHOUSE GAS derived mainly from the DENITRIFICATION process.

METHANE	CH ₄ . A GREENHOUSE GAS produced during ANAEROBIC FERMENTATION of ORGANIC MATTER, especially from enteric FERMENTATION in RUMINANTS and storage of LIQUID MANURE. A constituent of BIOGAS.
ODOUR	Pleasant or unpleasant smell.
ODORANT	A chemical or gas that causes ODOUR.
OLFACTORY	Pertaining to ODOUR
OLFACTOMETER	Apparatus for measuring ODOUR
ODOUR THRESHOLD	Minimum concentration of an ODOUR that 50% of a panel of people can smell.
PM	Any airborne, finely divided solid or liquid matter with an aerodynamic diameter less than or equal to 100 micrometers. PM10: Diameter \leq 10 micrometers; PM 2.5: Diameter \leq 2.5 micrometers.

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