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Technical trends for organic fertilisation

There's been a strongly increased requirement for more precision in spreading of solid and liquid manures with the main reasons the better exploitation of the nutrient values and reduction of environmental pollution risk. Labour and management aspects are also of increasing importance. The development of distribution technology for farmyard manure is characterised by requirements for more performance, soil protection and uniform nutrient application in that the distribution is increasingly carried out interfarm. Larger volumes, improved transport machinery and refined distribution techniques are signs of this.

As in poultry, calf and pig production an increasing proportion of animals in beef and milk production are being kept on straw through promotion programs for welfare-oriented livestock production as well as farmyard manure programs and this has led to increasing demand for suitable vehicles for such operations. Distribution quality depends on degradation degree, straw length and the dry matter content.

Solid manure systems

Distribution dates to suit crop growth requirements requires appropriate storage capacities. Processing before distribution doesn't normally take place. New generation spreaders are characterised by larger capacities (higher area performance). With the growing change in farm structures the distance between steading and field increases. Additionally, an optimum and, with that crop growth orientated, application time helps to improve nutrient exploitation and achieve optimum plant growth.

Caused by the larger load volumes there are greater stresses on the drive trains of the spreaders. Large volume low-pressure tyres are now expected. To keep ground pressure within acceptable limits, self-steering double, or even sometimes triple, axles now are in coming. Mobile tyre pressure regulation systems now allow the ideal air pressure to be selected for roadwork where rolling re-

sistance is reduced and therefore wear and energy consumption cut back and to keep draught resistance and ground pressure to acceptable limits in the field. Dosing still represents a problem with solid manure spreaders. The accuracy of travelling speed regulated chain and bar systems with push bar depends to a great extent on the material rotting degree. Uniform nutrient distribution is required and therefore to be striven for. Dung turning is a requirement for uniform rotting and this then helps improve the nutrient dynamics. In any case such an operation is more cost-effective than investment in additional expensive machinery.

Broadcasting systems with spinner discs are standard nowadays. These chop and distribute solid manure better than most horizontal or vertical roller spreaders and also achieve greater working widths. Improvement of distribution with heterogeneous material is possible through adjustable (length and angle) throw blades and movable presentation point at the spinner discs. With high nutrient concentration homogeneous material it is practical to equip the spreaders with a weighing system. Uniform material and nutrient distribution allows the possibility of a preset application amount per hectare combined with optimum working width.

From the technical and labour input aspect environmental and crop oriented fertilising with solid dung is an expensive exercise.

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Keywords

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Fig. 1: Turning of solid manure improves even rotting (Photo Manitou)





Fig. 2: Slurry trailer with mobile weighing techniques makes the proof of slurry quantities applied easier (Photo archives)

Liquid manure systems

Here, environmental requirements are also in the foreground. The tendency goes towards reducing the amount applied and thus the nutrient load on the environment. New feeding equipment, feeding nutrients according to requirements and special drinkers which help to avoid unnecessary water waste can be seen as characteristic of actions in this direction. Especially helped here are farms producing more slurry than their manure balances allow and in a context where transporting slurry into mainly arable farming areas becomes very expensive.

Also a requirement with slurry is a nutrient-adjusted and crop required application. The necessary storage capacities have now been created. The proportion of slurry silos increases. Altered legislation means there's increased need for silo covers. Where domestic housing is nearby odour emissions can lead to problems. Silo covers also help to reduce ammonia emissions during storage.

For this there are many different possibilities available. The target is to achieve an emission reduction of at least 80%. This can be achieved with a natural floating cover as well as with a chopped straw cover, one of granulate, a tent cover or a solid roof. Filling mostly takes place over the container edge and under the floating cover. Where fibre-rich litter is used the use of a submersible chopper pump to expedite the slurry from pre-storage pit to the main container is promoted, otherwise electrically powered displacement pumps are sufficient.

A homogeneous slurry is a requirement for uniform distribution. From the many different stirring or agitation technologies, propeller agitators have established themselves increasingly because of their better efficacy. Hydraulic systems (with pump and agitator-nozzle) are only applied now and again in smaller containers.

Electrically powered submersible agitators with over 10 kW power continue in demand, as do tractor powered rod mixers. As silo mixer models these can offer a good job of mixing in silos of over 4 m height and are especially suitable for use over several farms.

Clear results are available related to construction and agitator concepts for round containers (silos). With slurry cellars the physical constructional and flow-technological knowledge does not appear to have spread enough yet. Only this conclusion can explain the wide range of slat mixers on offer. Through poor disintegration of submerged layers or blockages in some areas of the storage through floating layers or poor design it is necessary to use these small machines to help in agitation. They can be regarded as standard equipment for the agitation of slurry channels.

Slurry application

Bringing out slurry continues to be mainly done in a one-way system with the same trailer used for transport and application. Thoughts of using specialised transport for each task have only found larger acceptance in a few areas. Where equipment is used over several farms or with machinery rings this latter solution is favoured.

Where a single trailer is used, the size of tanker and its capacity has been increasingly raised for more area performance. Such tankers are partially produced with weight transfer onto the tractor with up to four steering axles, liftable axles with large low pressure tyres and mobile tyre pressure regulating equipment so that rolling resistance on the road and ground pressure can be both held within acceptable limits.

For high performance filling of these giant tankers which are meanwhile motorway-acceptable, dock arms and vacuum pipes are

now available. The latter have a higher filling performance when used in combination with a hydraulically driven rotary pump on the vacuum pipe. Filling aids are ever more popular, especially where the operation has to be carried out from deep lying channels and containers.

The distribution and dosing quality of the different systems is being continually improved through electronic indication and regulation systems. Here, the technique has reached the same standard as mineral fertiliser distribution. According to the fertiliser application regulations, broadcasters can only be used under certain weather conditions or on fields where the manure is subsequently incorporated. This helps encourage the continuing trend for trailing hose slurry spreaders. No problem nowadays is working widths of more than 20 m where dosing and distribution has been improved. Integrated control makes operation and monitoring easier. For slurry application on grassland, machines which deposit the material on the ground although not in the grass roots are becoming more popular. Less emissions, reduced crop contamination and therefore better growth qualities are the wished for results from this trailing shoe implement. There is no longer any discussion over slit injection systems now. In our regions these no longer have a role with their lack of improved emission avoidance, higher power requirement and energy consumption. Grass sole damage, higher distribution costs and limited area performance also speak against this technique.

Preparation

There is less discussion also about the further processing of slurry. Neither additives nor separation with the different concepts of evaporation, filtering or reverse osmosis achieved any sort of acceptance in practice. On the other hand the interest in biogas plants has risen considerably. The increase in producers price for electricity produced in this way and the possibility of cofermentation, the recycling of organic waste from the industrial sector against certain payments, have had a positive effect on the cost-efficiency of such plants.