



# Separation of Slurries

Pig and dairy slurries have a significant solids content which can lead to problems in storage and handling. It is possible however to separate some of the solids from the liquid to leave more easily handled solid and liquid fractions.

## Settling characteristics of slurry



*Poor settling qualities  
High solids content*



*Liquid layer*

*Settled solids*



*Crust*

*Liquid layer*

*Settled solids*

## Problems with high solid content slurries

During storage of the slurry, settlement takes place causing partial separation of the solids and liquids. This results in sludge deposits on the bottom of storage tanks and in the case of dairy slurries a floating crust in the surface. Removal of settled solids and crusts is expensive. Separation prior to

storage helps to avoid this cost.

Pumping of unseparated slurry is difficult, partly because of its high viscosity and partly because of blockages caused by the solids. As a consequence pump sizes can be up to 5 times larger and are often of the chopper mixer variety.

## The advantages of separation

- Avoids the formation of thick sludge and crusts in storage tanks and lagoons.
- Reduces the total volume of waste to be stored by about 20%.
- Gives two easily handled products (a solid and a liquid).
- Produces a saleable by-product in the form of a rich solid fertiliser.
- Reduces the Biochemical Oxygen Demand (the pollution potential) of the remaining liquid by about 20%.

## Types of separator

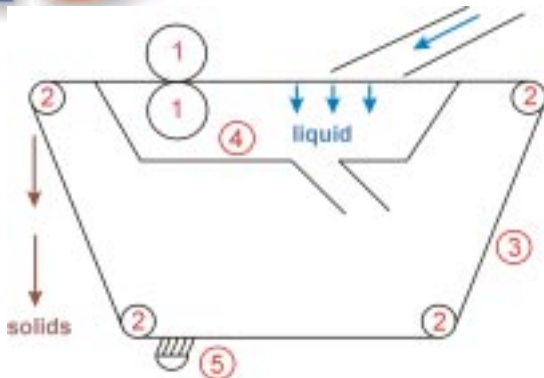
There are a number of types of separator in common use with farm slurries. Some of these are described below. Not all separators are suitable for all types of slurry and their efficiencies will vary with regard to the resultant dry matter content.

### Belt press separator

This separator works very much on the same principle as an old fashioned washing machine mangle. Slurry is fed onto a fine mesh screen and the free liquid drains through. The remaining slurry is then pressed against the screen by rollers, squeezing out more liquid. The oils are then brushed from the screen and fall by gravity into a reception pit or trailer.



### Belt press separator



- 1. spring loaded roller press
- 2. belt guides
- 3. belt
- 4. liquid collection trough
- 5. brush

The screens are normally made from stainless steel or synthetic fabric. Larger mesh holes in the screen increase the throughput of a machine but give wetter separated solids. Cattle slurry requires larger mesh holes than pig slurry.

These separators work best for slurries with up to 8% dry matter. If higher dry matters are anticipated, slurry should be diluted with surface or cleaning water or the separated liquor should be partially recycled. The resultant solids, range from 20-30% dry matter. This type of separator can be used for pig and cattle slurries.

### Roller press separator

This separation technique involves pressing the slurry against a stainless steel screen forcing the liquid out of the solid fraction. The technique usually has two stages. The first stage acts like a sieve allowing the excess fluid to drain through the screen. The remaining slurry is brushed into the second stage where rollers press the solids against

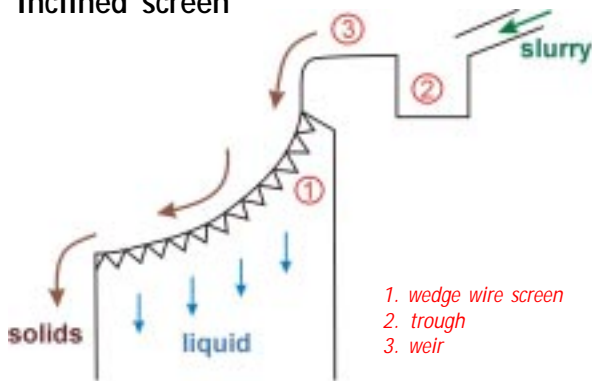
the screen exuding more of the liquid into the collection tank. Brushes or rubber scrapers follow the rollers removing the pressed solids which then fall into a reception area or trailer.

These separators work best for slurries with up to 8% dry matter and they produce solids with dry matter ranging between 18 - 22%. They are suitable for dairy and pig slurry.

### Inclined screen

These are the simplest form of separator and have no moving parts. The slurry enters a trough at the top of the machine then flows over a weir onto a sloping screen. The trough has to be perfectly level

### Inclined screen



- 1. wedge wire screen
- 2. trough
- 3. weir

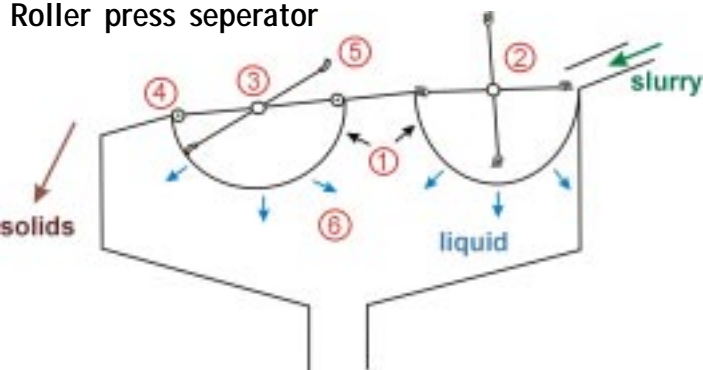
to get an even flow over the full width of the screen. The solids slide off the screen whilst the liquid passes through the mesh into a reception tank. These separators are often referred to as wedge-wire screens, which refers to the shape of the mesh. It has been found that a wedge shape is less prone to blockage.

As the screen works best with slurries of not more than 5% dry matter, they tend to be more suitable for pig slurries. They produce a solid with a dry matter of about 10 - 12%.

### Vibrating screen separator

Slurry is fed onto the vibrating screen via a sluice gate or weir arrangement. The vibrations cause the solids to move across the screen and they fall off the end either into a trailer or a loading area. The liquid fraction drops through the screen into a reception tank to be pumped away.

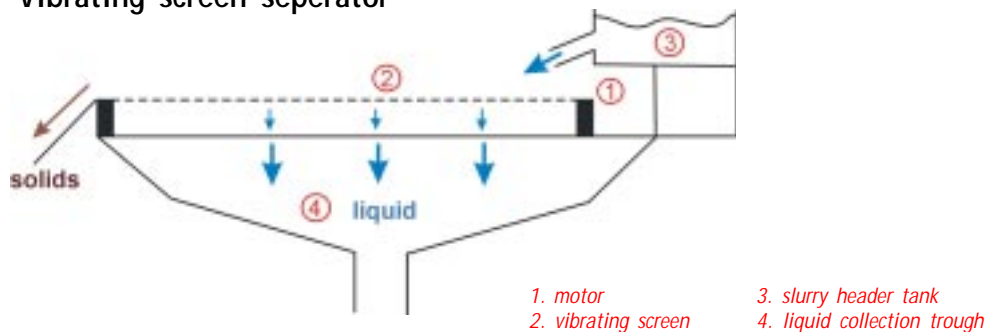
### Roller press separator



- 1. spring loaded roller press
- 2. stage 1 - brush press
- 3. stage 2 - roller press
- 4. spring loaded roller presses
- 5. scrapers - brush or roller
- 6. liquid collection trough



### Vibrating screen separator



The screens work best with 3 - 5% dry matter content and produce a wet solid with a dry matter of between 11 - 13%. This type of separator is also more suitable for pig slurry.

solids is easy and there is no residual liquid run-off. Also rainwater tends to shed from the surface of a heap so dirty rainwater disposal problems are minimised.

### Press screw separator

The liquid fraction is particularly fibre free and does not separate during storage.

The first stage of separation of the slurry is achieved by a combination of vibration and gravity to encourage the liquid fraction to pass through the cylindrical 'wedge wire' screen. The remaining solids are pushed by the screw auger towards the mouthpiece. A plug of compacted solids is thus formed and the pressure created squeezes out more liquid through the matrix. The counterbalanced restrictor can be adjusted to give optimum separation.

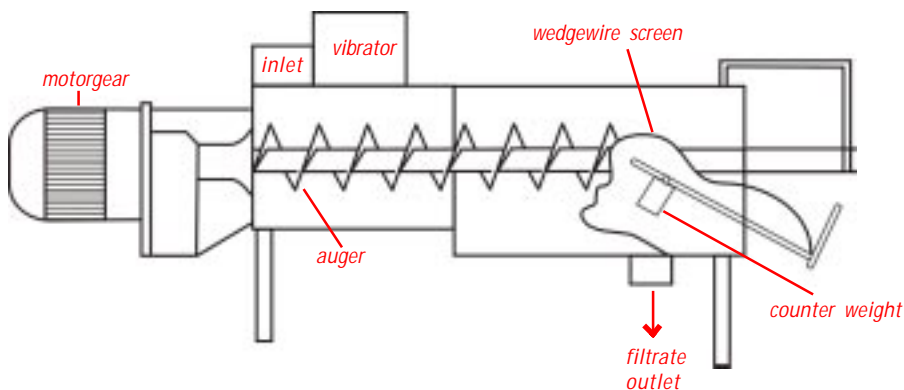
### General comments

Separators are usually mounted in a gantry so that the solid and liquid fractions can fall by gravity into their respective containment areas. In this exposed position frost protection may be required to stop the process from freezing up in very cold weather.

Solid dry matters of between 25% and 35% can be achieved with this type of separator allowing composting if required. Stacking and storage of the

Solids are stackable if they contain over 16 - 18% dry matter and can be handled as farmyard manure. If the solids content is less than this then provision must be made to collect the run off from the storage area. This also applies if rainwater is going to wash through higher matter solids.

### Press screw separator



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