OVERFLOW SLURRY CHANNELS

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One of the ways of emptying slurry channels in livestock buildings is to allow the slurry to flow continuously out into a receiving pit or external slurry store. The system of overflow slurry channels has the following advantages:

- no need to add water in order to disperse deposits of solids within the channel
- no need to agitate the slurry prior to emptying
- no supervision
- no maintenance
- if external slurry storage is provided, only shallow channels are required and building costs are reduced

To allow the slurry to flow, a 0.15 m high slurry retaining lip is constructed at the discharge end of a flat-bottomed slurry channel. The function of the lip is to retain a lubricating layer over the entire area of the channel floor. This layer facilitates the slurry flow (Figure 1). In cattle slurry, solid particles tend to accumulate on the top while in pig slurry there are two or three strata of different specific gravities. After a period of about three weeks the slurry surface forms an incline of 1.5–3% and the slurry moves continuously over the lip into either a receiving pit or an external slurry store.

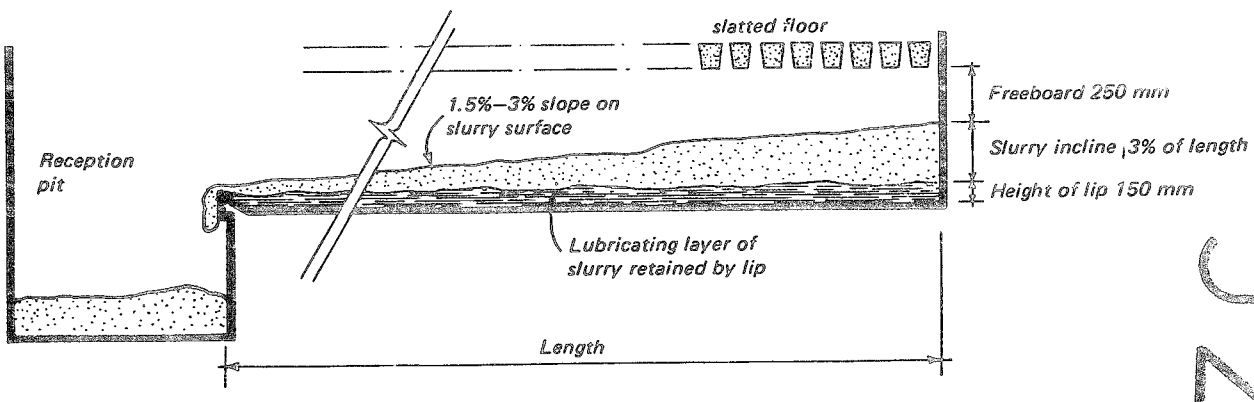


Figure 1 Principle of operation and depth of overflow slurry channel

WHAT ARE THE LAYOUT CONSIDERATIONS ?

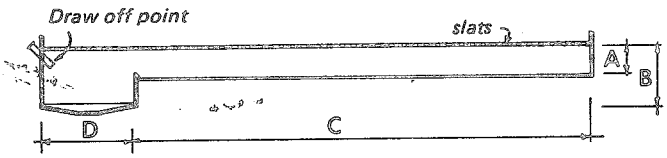
Small buildings with one or two slatted areas can often be designed so that the channels discharge directly into a single reception pit or slurry store. In larger and more complex units the channels are arranged to discharge into cross channels leading to the reception pit or store. In general the layout of the collecting and cross channels will be determined by the overall dimensions of the building and the location of the external slurry storage, if any.

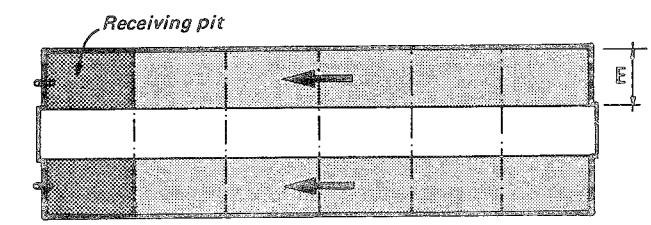
The width of the channel in the case of cattle slurry is not important, but is usually 1.5—4 m. In the case of pig slurry the width should be no less than 1 m and is usually 1.5 m. If the channel is much wider then meandering flow may occur in pig slurry. The length of the channel should not exceed 27 m, though there have been reports of some continental units operating with 34 m long collecting channels.

Because the slurry forms only a small incline of 1.5—3%, relatively shallow channels (0.7 m deep) can be used. This aspect is particularly useful on rocky sites, where excavation for conventional slurry cellars may be too costly.

The overflow retaining lip can also be used in conjunction with conventional slurry cellars for long-term storage. In this case a receiving slurry pit is constructed at the gable end, within the building and separated from the collecting channels by the overflow lip. The slurry is emptied directly from the receiving pit using a vacuum tanker.

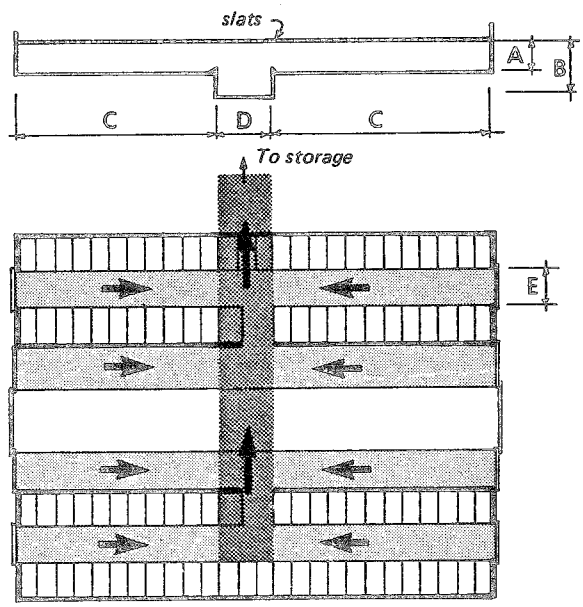
Examples of overflow slurry installations in some typical cattle and pig buildings are shown in Figure 2.



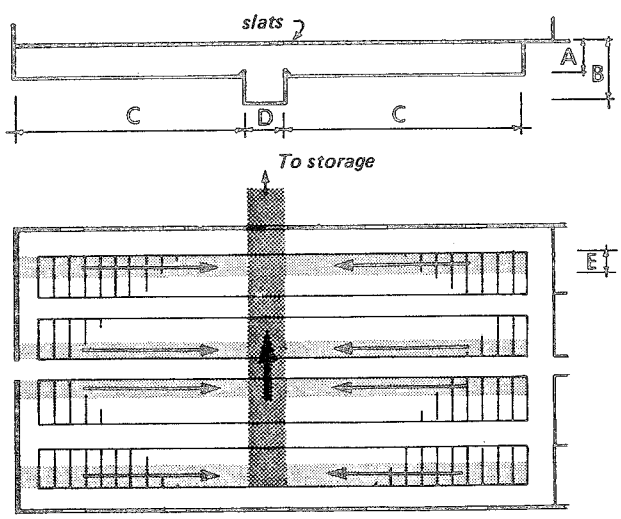


Slatted cattle court

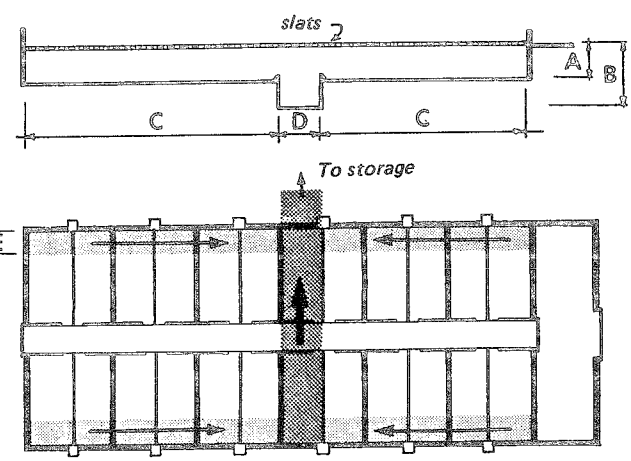
	Dimension (metres)				
	A	B	C	D	E
Slatted cattle court	1.80	2.80	24.24	4.80	3.10
Cubicle house	0.80	1.80	13.04	3.0	2.45
Dry sow house	0.75	1.45	11.60	1.30	1.20
Pig fattening house	0.80	1.45	13.85	1.30	1.20



Cubicle house



Dry sow house



Pig fattening house

Figure 2 Some examples of overflow slurry channel systems

HOW ARE THE CHANNELS DESIGNED ?

Channel depth

The depth required depends on the length of the channel and the angle of incline of the slurry. Measurements made on overflow slurry channels on Scottish units indicate that for cattle fed diets with relatively high moisture contents such as grass silage or turnips, the incline is less than 2%. For diets with high dry-matter contents such as haylage and maize silage, the angle will be somewhat greater. It is therefore advisable in most cases to design for an angle of 3% to allow for possible changes of system during the life of the building. An allowance of 3% should also be adequate for pig slurry.

The depth from below the slats to the floor of the channel is therefore normally 3% of the channel length plus 400 mm. This allows 150 mm for the height of the lip and 250 mm 'freeboard' above the slurry at its highest point, as shown in Figure 1.

Example For a channel length of 20 m the depth will be 1 m calculated as follows

Allowance for slurry incline: 3% of 20 m = 20 X 3 ÷ 100	=	0.600 m
Allowance for overflow lip and freeboard	=	0.400 m
Total depth	=	1.000 m

The additional depth for cross channels is calculated in the same way.

Channel floor and walls

The floor must be laid level. Floor and wall construction should follow normal practice for below-slat channels, taking particular care to make them watertight to prevent seepage of liquids.

Overflow lip

Details of the overflow lip are shown in Figure 3. The by-pass openings, which are normally closed by the lids shown, facilitate cleaning out of the channel if it ever has to be emptied completely, or when it is emptied every three years as recommended below.

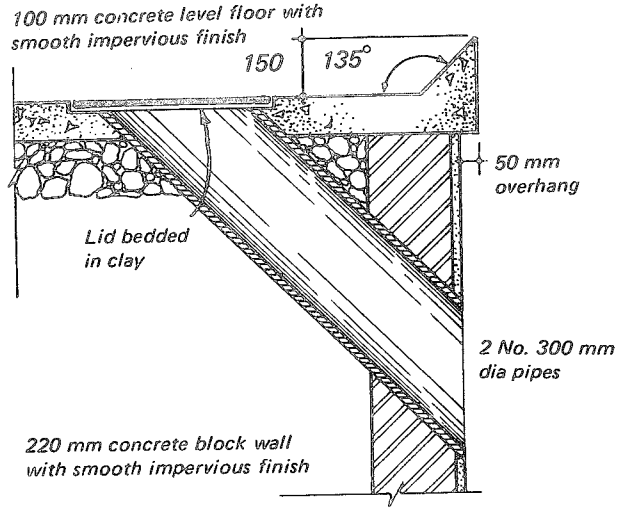


Figure 3 Detail of overflow lip and bypass

WHAT ARE THE MANAGEMENT DETAILS AND LIMITATIONS ?

Flooding of channels

Prior to stocking the building the channels must be filled with water up to the top of the retaining lip. This is to ensure that no slurry adheres to the floor of the channel.

Stocking the building

It is recommended that heavier animals should be kept near the overflow lip. As these animals produce more waste (feed and slurry), the material has to travel a minimum distance to the storage or reception pit. A typical arrangement is shown in Figure 4.

Should the building be only partly stocked or if it is not used during the summer period, some water should be added in order to compensate for evaporation losses.

Feeding system

Owing to the poor flow characteristics of slurry with a high dry-matter content (over 12%), this system of slurry handling is not recommended for cattle which are primarily hay fed. It is also important to minimise feed wastage, especially of bulk feeds, by provision of an effective feeding barrier e.g. a tombstone fence, diagonal bars, or self-locking yokes.

Cleaning out

Experience has shown that it is desirable to remove all the slurry and to wash out the channels once every three years. To allow easy cleaning a by-pass opening is installed under the overflow retaining lip as shown in Figure 3.

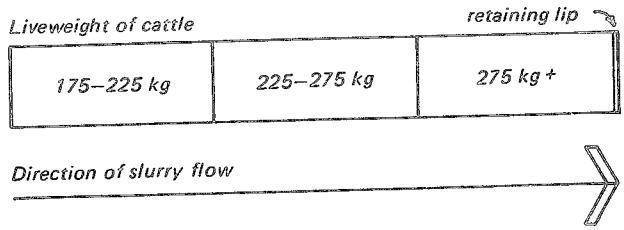


Figure 4 Recommended distribution of cattle within a building equipped with overflow slurry channels

ADVICE

Advice on all aspects of farm buildings is available from the appropriate College Farm Buildings Department.

Farm Buildings Advisory and Development Department, East of Scotland College of Agriculture, Glenbourne, 6 South Oswald Road, Edinburgh EH9 2HH

Farm Buildings Division, North of Scotland College of Agriculture, Craibstone, Bucksburn, Aberdeen AB2 9TR

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February 1977

Published by The Scottish Farm Buildings Investigation Unit
Craibstone, Bucksburn, Aberdeen AB2 9TR