

## TECHNICAL NOTES

### A METABOLISM UNIT FOR USE WITH MALE PIGS

Many metabolism units have been described in the literature for various species of domestic animals. The three most common animals studied are the ox, the sheep and the pig. The former two species are well suited to harness while the sheep has the added advantage of producing pelleted faeces. Because of its shape a pig is not well adapted to harness. Wood and Woodman (1924) have described one supporting an apron at the rear of the pig which proved successful when tested on a 286-lb animal. The testing by the author of a harness of a different design based on sketches obtained from Dr. A. G. Chamberlain of the National Institute for Research in Dairying, Reading, England, met with little success when a 50-lb pig was used. Not only did the harness change position but a pig of this size soon became entangled by repeated lying and standing.

In much of the reported digestibility work with pigs, no or only vague reference is made to the method of collection of faeces and urine. In some cases (e.g. Clawson *et al.* 1955; Sheehy and Maguire 1959) it must be assumed that excreta is collected from the floor of the pen. With such a technique, complete collection of faeces and prevention of contamination by urine would be impossible without continual supervision. In the units referred to by Fraps (1932) and Forbes *et al.* (1914), the pigs were maintained on metal grid floors below which was a fine-mesh screen. The screen retained the faeces but allowed the urine to pass through. In this type of unit, one would expect some urine contamination of faeces and some retention of the faeces by the metal grid floor. This comment would also apply to the circular cage of Bell (1948), where feed contamination could be a further complication.

Another type of unit has been described by Hansard *et al.* (1951). This operates on the principle that it can be adjusted in length to suit the size of the pig, thereby ensuring that faeces always drops behind the rear end of the floor. If a pig is to stand, feed and lie down in such a unit it would be difficult to reduce the backward-forward movement to the extent such that all faeces is cleanly collected. Apparently to nullify the effect of this movement, Watson *et al.* (1943) provided a harness and apron in their combination sheep/swine unit.

The unit described below was based on the design of Hansard *et al.* (1951). The numerous modifications in both building materials and design were considered sufficient justification for the presentation of this note. This unit was designed to provide for separate collection of urine and faeces over the 40 to 200-lb body-weight range. The construction allows the pig to move backwards and forwards and to lie down in comfort.

### Design

The framework of the unit is made from 2.25 x 1.5 in. slotted steel angle, 0.08 in. thick (Dexion 225/80S manufactured by Dexion (Aust.) Pty. Ltd.) with phosphate undercoat baked enamel finish. The unit is 60 in. long, 24 in. wide and 60 in. high (Figure 1). Castors are attached at each of the lower corners. The floor on which the pig stands is raised 24 in. This floor consists of pine boards 3 in. x 1 in. and 4 in. x 1 in. with a steel grid below the feed trough and another below the preputial area (Figure 2). The steel grids are made from woven wire mesh. This mesh has an 0.5 in. aperture and is made from 0.232 in. galvanized steel wire (manufactured by Melwire (Qld.) Pty. Ltd.). The grid below the feed trough is 8 in. x 24 in. and that below the preputial area 20 in. x 24 in. Both grids are turned down 1 in. at each side.

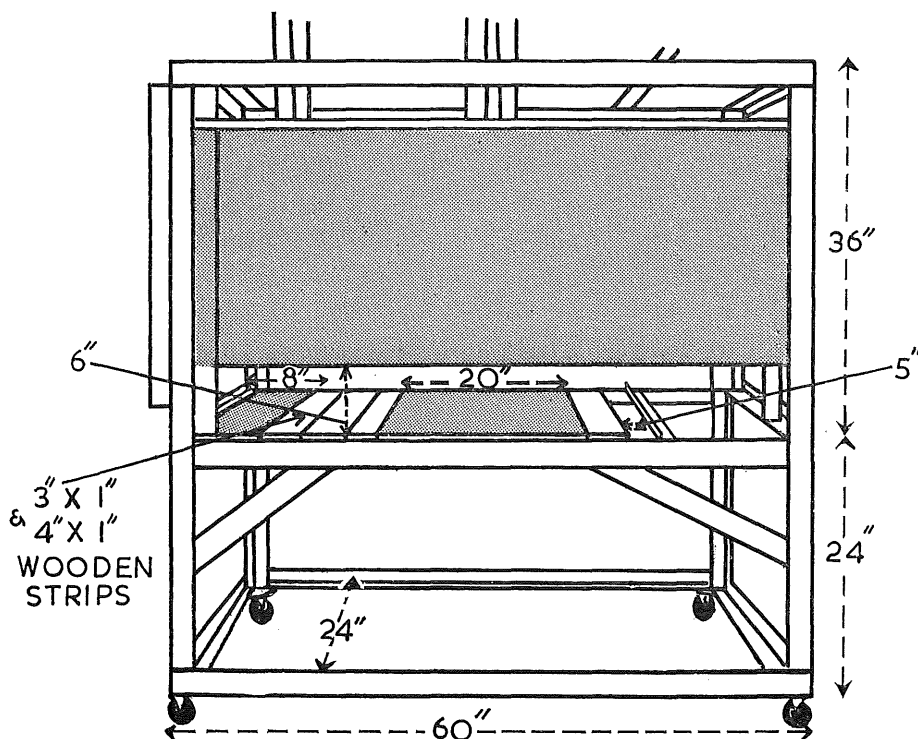


Fig. 1.—General dimensions of unit.

The false sides of the unit are movable and come to within 6 in. of the floor. This space can be reduced to 3.5 in. by attaching a length of the slotted angle to the lower edge of the side. Sheeting is with  $\frac{3}{16}$  in. marine plywood (Australian Standards Specification AS059). In an earlier design (Figure 2), flattened expanded metal (steel) was used in the construction of the sides, but this was later covered with plywood because of the risk of injury to both attendants and pigs from the sharp edges.

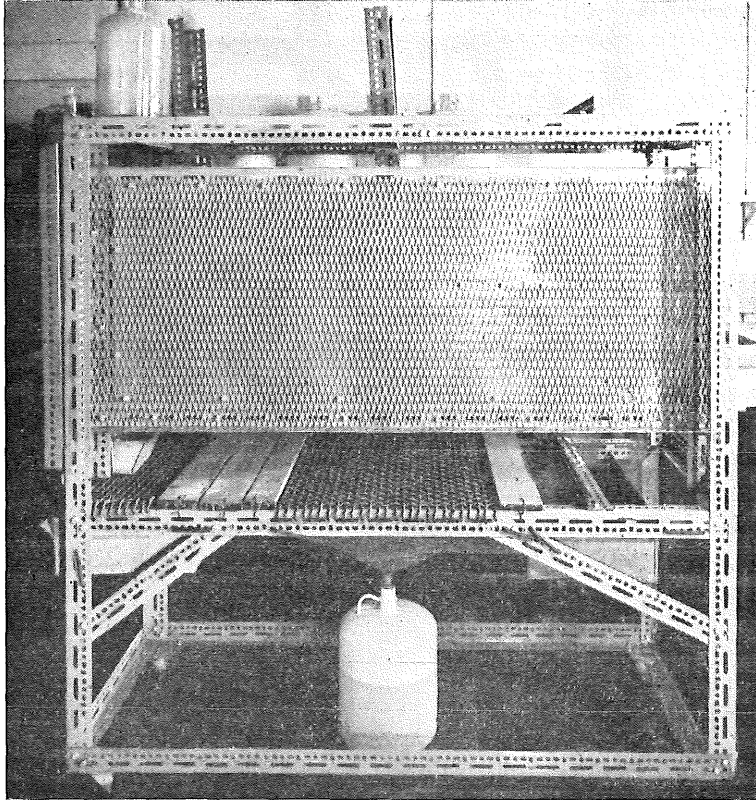


Fig. 2.—Side view of early design with uncovered steel sides, later covered with plywood.

The width, length and height of the unit can be altered respectively by moving the false sides, removing the floor boards and adjusting the backstop, and raising

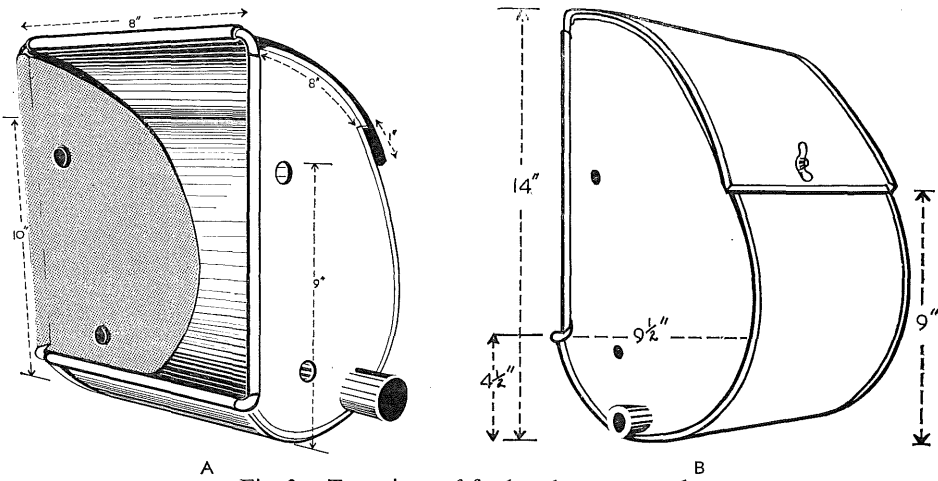


Fig. 3.—Two views of feed and water trough.

or lowering the framework at the top of the unit. This framework is made from slotted angle and is 7 in. wide x 18 in. long and is attached to four vertical slotted angle uprights.

Feed and water are supplied in a hooded trough (Figure 3) made from 22-gauge galvanized iron. The trough is provided with a lid and a draining hole and is attached to two vertical slotted angle brackets which allow for adjustment in height. The whole of this front section is hinged (Figure 4). For ease of cleaning, the cross-members below the feed trough are made of 2 in. x  $\frac{3}{16}$  in. iron section. When it is necessary to have water available during the feeding period, a separate trough (Figure 5) supplied with water from an overhead sealed container (Figure 4) can be provided.

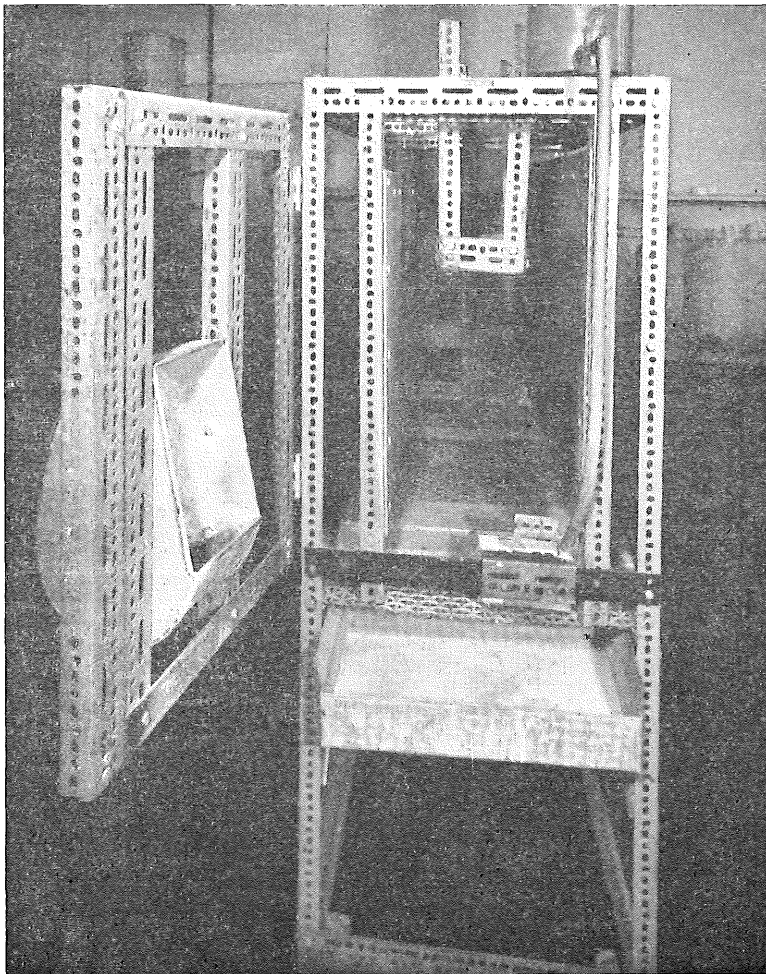


Fig. 4.—Front view of unit, showing feed and water troughs and feed spillage tray.

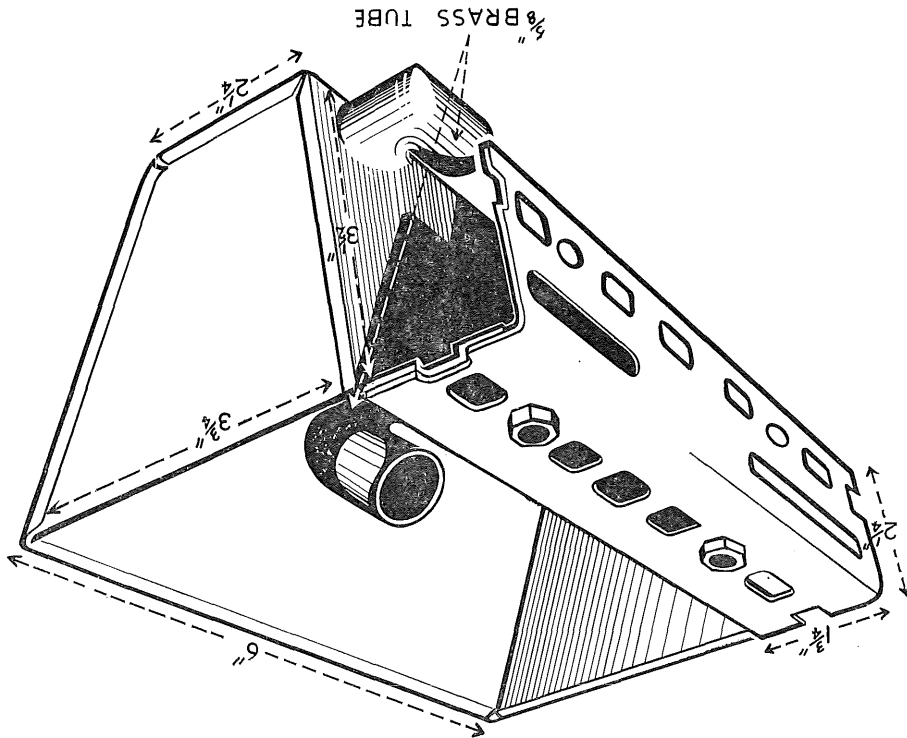


Fig. 5.—Separate water trough for use with *ad lib.* feeding.

Below the floor of the unit is situated a feed spillage tray, a urine funnel and a faeces collection tray. All are made of muntz metal (a 60 per cent. copper, 40 per cent. zinc alloy).

The position of these trays and the funnel can be adjusted to suit the length of the pig. All are 20 in. wide. The faeces tray and spillage tray are each 13 in. long and 5 in. deep, while the funnel is 20 in. long and 9 in. deep. All are provided with 1-in. diameter draining outlets. Below the outlet of the spillage tray is a cylindrical galvanized iron strainer 4 in. dia. x 8 in. deep with a base made from stainless steel mesh (0.22-in. dia. wire with 0.0405-in. aperture).

### Operation

To date these units have been used only with pigs of 40 to 200 lb body-weight. The animals are normally weaned at five weeks of age and accustomed to handling. When a body-weight of approximately 35 lb. is attained they are introduced to the unit. The unit is first adjusted to a height and width about 1 in. larger than those of the pig in the standing position. Room for approximately 6 in. movement is allowed lengthwise. To

introduce the pig, a portable ramp is attached to the back of the unit, the back stop removed, and spare boards inserted at the rear of the unit. Feed is placed in the feed trough, care having been taken to ensure that the pig is hungry.

When the pig has entered the unit it usually commences to feed. Within a few hours even the most refractory animal becomes accustomed to the fact that it cannot escape. Any feed remaining after 1 hr is removed from the trough, which is then filled with water. The pig is then fed twice daily and provided with water between feeds. After 1 or 2 days the height and width of the unit can be increased by 1-2 in. The pig can be gradually given more room for movement until by the time a body-weight of 60 lb is attained it has little inclination to turn and can be allowed a space of up to 4 in. on either side.

When a pig is being accustomed to the unit it is advisable to reduce the space at the lower edge of the side by attaching a length of slotted angle. At an approximate body-weight of 50 lb this slotted angle can be removed so that the growing pig can fully extend its legs and be comfortable in the lying position (Figure 6).

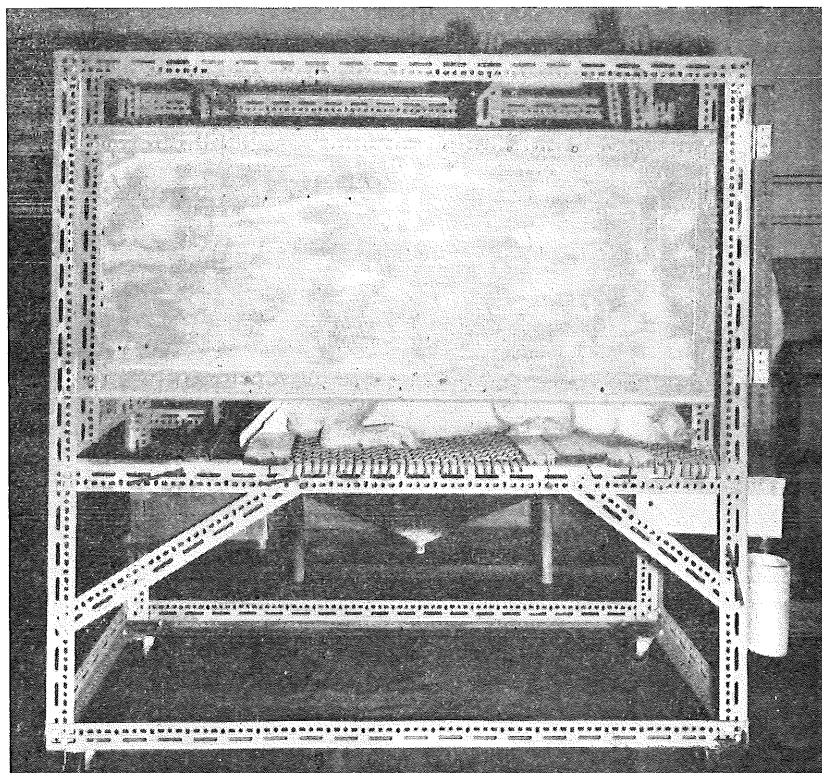


Fig. 6.—Side view of unit showing pig lying down. The elevated side allows the pig to lie on its side and fully extend its legs.

For the complete collection of faeces it has been found necessary to fit the pig with an apron. This is made from proofed duck (cotton—10 oz/sq. yd.) and after being cut to the pattern in Figure 7, is attached with "F-F" branding cement (manufactured by Nebraska Salesbook Co., Lincoln, Nebraska, U.S.A.). The top 8 in. of the apron is liberally coated with cement and attached to the pig as in Figure 8, after the rump has been cleaned and clipped. This apron will require little attention during a 7-day collection period. To stop the pig from lying down while attaching the apron, a strap suspended from the sides is passed under the flank. Talcum powder applied to the top of the apron after fitting to the pig prevents any excess cement from adhering to the unit.

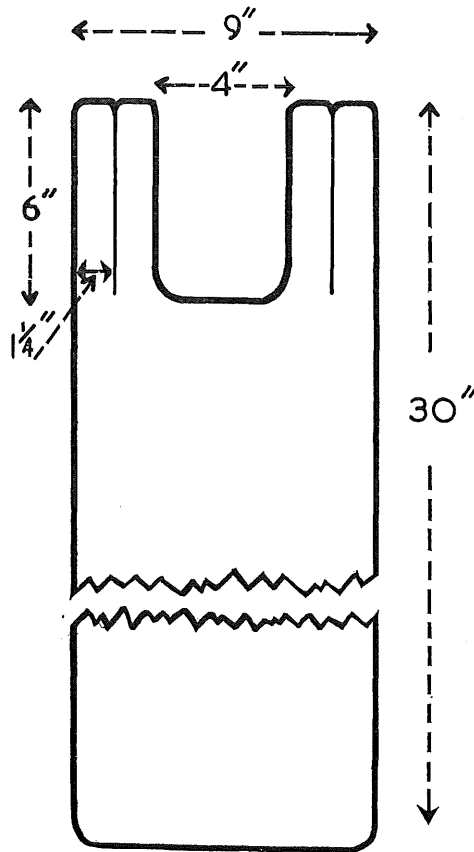


Fig. 7.—Pattern of apron for attaching to rear of pig.

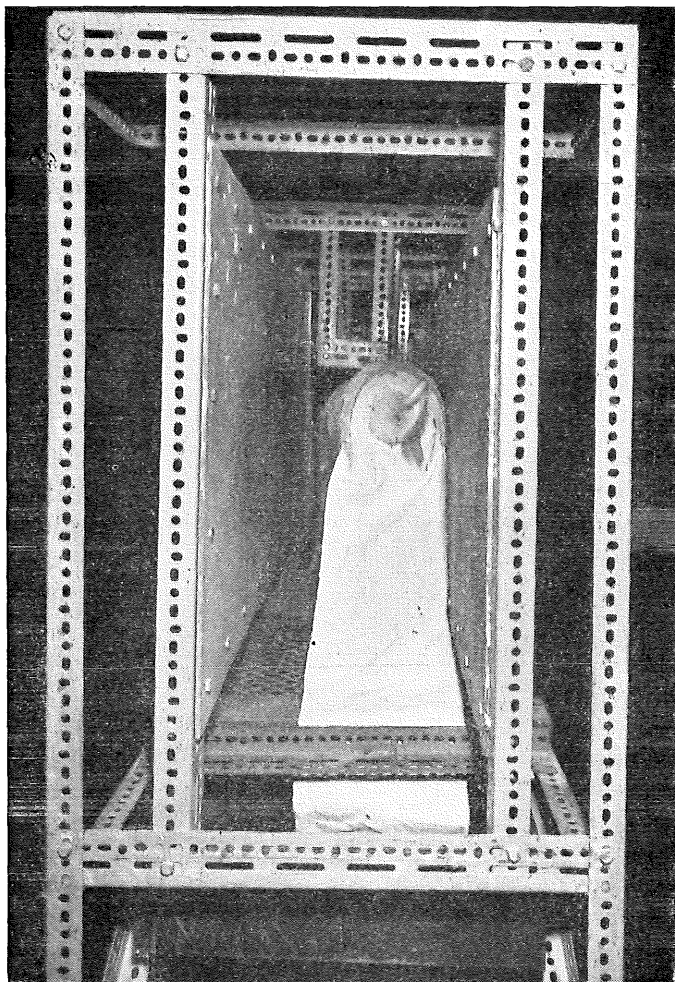


Fig. 8.—Apron attached to pig in unit.

In the use of this unit a procedure had to be devised to measure spilled feed accurately. This spillage is obtained with all pigs and in some cases becomes quite appreciable. Because of the volume of water which may be either splashed or drained into the spillage tray, the drying of the spilt feed in some cases would be impracticable. To overcome this problem the material is washed over the strainer and the dry matter determined on the fraction retained. The dry matter of this retained fraction is corrected by a factor obtained by washing a sample of the complete ration over the sieve. This procedure is applicable only when the ration is homogeneous and is dependent on the assumption that the spillage is of a composition similar to that of the ration.



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