

The following recommendations do not apply to so-called pen stables or loafing barns in which there is a thick manure and bedding pack on the floor, and in which doors are normally kept open.

Outlets. One flue will serve a stable 200 ft long. In stables over 120 ft long, the flue should be about midway between the ends or, if the stable is L-shaped, near the angle. In shorter stables, it may be at any convenient location.

The exhaust point in the stable should be not more than 18 in. above the floor. This permits removal of only the coolest air, and prevents rapid fluctuations in stable temperature.

A basic rule for finding the cross-section of the outlet flue is

$$A_o = \frac{176 N}{\sqrt{h}} \quad (6)$$

where

A_o = area of the outlet flue, square inches.

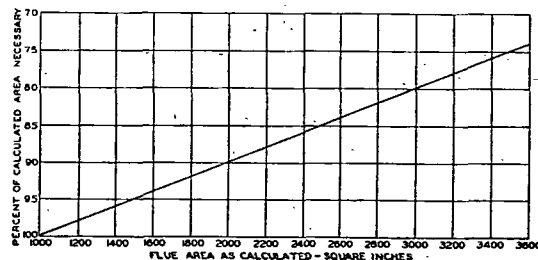


FIG. 6. MODIFICATION OF FLUE AREA FOR OUTLETS EXCEEDING 1000 Sq In.

N = weight of animal population, thousands of pounds.

h = vertical distance from top of inlet flues to top of outlet flue, feet.

For large flues the flue area obtained from the basic formula may well be reduced according to the chart, Fig. 6, because of a decrease in friction.

Example 2: Assume a stable in which the vertical height from the top of the inlets to the top of the outlet flue is 32.5 ft, and in which 38 cows, averaging 1300 lb, will be housed. Determine required size of outlet flue.

Solution: From Equation 6

$$A_o = \frac{176 \times (38 \times 1.300)}{\sqrt{32.5}} = 1525 \text{ sq in.}$$

From Fig. 6 the factor to be applied to this area is 94.5 percent. Therefore, the area of flue required is $1525 \times 0.945 = 1441$ sq in.

Inlets. Inlet flues, each approximately 60 sq. in. in area, have given good results. One such flue should be provided for each 3500 lb animal weight. They should deliver air from points 12 to 18 in. below the ceiling.

Sheep Barns

Shelters used for breeding and feeding stock usually have enough open-

ings, so that no special provision for ventilation is required. Barns for winter lambing flocks, however, require ventilation systems. Fermentation in the floor pack of manure produces heat, vapor and odor. These must be added to the ventilation load regularly produced by the animals.

Outlets. In practice, results obtained by the basic formula, Equation 7, when modified by the use of the chart, Fig. 6 have given good results:

$$A_o = \frac{4A_i}{\sqrt{h}} \quad (7)$$

where

A_o = area of the outlet, square inches.

A_i = floor area, square feet.

h = vertical height from top of inlet openings to top of outlet flue, feet.

The bottom of the outlet flue should be 15 to 24 in. above the surface of the manure pack.

Inlets. Provide one inlet, 60 sq in. in area, for each 150 sq ft of floor area. Inlets should be well distributed around the side walls, and designed to deliver air near the ceiling (see section on Dairy Stables).

Swine Barns

Community swine barns, because of the extent of slop feeding and the absence of daily cleaning of the pens, are the most difficult farm buildings to ventilate satisfactorily. Farrowing pens, to which supplemental heat is supplied, present less of a problem. In all cases, good floor drainage to remove urine and excess spilled water is important.

Temperatures of from 50 to 55 F are usually recommended for farrowing pens. It is desirable to maintain temperatures above freezing in all other pens in community houses. For barns that are well stocked and adequately ventilated, this requires walls with an overall thermal resistance of from 3 to 6, and ceilings with 40 to 50 percent greater resistance.

Outlets. The outlet flue should draw air from a level of 15 to 18 in. above the floor. Equation 8 is the basic formula for flue area, and gives reasonably good results when modified according to the chart, Fig. 6.

$$A_o = \frac{5 \times A_i}{\sqrt{h}} \quad (8)$$

Inlets. At least one inlet flue should be used for each pen. Swine are given or select definite nesting places, and care must be exercised to avoid having inlets located over them.

Total inlet area should be approximately 70 percent of outlet area. The area of individual inlets is best determined from the total area required, and the number that can be so installed as to meet previous specifications. Inlets should deliver air from points 12 to 15 in. below the ceiling, or from a level deflector on a sloping ceiling.

Poultry Laying Houses

From the standpoint of ventilation, poultry laying houses may be divided into cold houses and warm houses. The former are uninsulated, except in the ceiling. The inside-outside temperature difference is seldom more than 5 F deg. In the warm house, because of insulation or supple-