TABLE 1. USUAL TEMPERATURES REQUIRED IN GREENHOUSES

KIND OF VEGETATION	TEMPERATURE REQUIRED, DEG. FAHR.
Violets Camelias Azaleas Lettuce	40 to 45
Cool Palm Houses Carnations	50 to 55
General Purposes Roses Mushrooms	55 to 60
Forcing Houses Conservatories Orchid Houses Fern Houses	60 to 65
Peach House Vinery Early Tomatoes and Cucumbers Tropical Palm House	65 to 70

coils are arranged lengthwise of the house they must be heated evenly and proportionately to the cooling effect of the ventilation. However, in practice excess radiation must always be placed at the ends of the house to compensate for the extra heat losses at the gable ends. The result is that when the roof ventilation is open, the ends of the building tend to over-heat. Any small leakage of supply valves or return traps also tends to cause over-heating of the ends of the long coils. A curious observation is that the air in a greenhouse tends to move in a direction opposite to that of the wind outside. This causes over-heating of the windward end and under-heating of the leeward end. This reverse interior current also causes a lowered relative humidity at the leeward end and excess moisture at the windward end; since such leakage as there is tends to enter from the leeward end.

In one case when unit heaters with electric fans were installed in a rose greenhouse, observations with thermometers and humidity instruments indicated excellent results, but the roses would not grow until the air velocity from the unit heaters was reduced to a very gentle current. The most recent testimony seems to indicate that in general, when steam is used the electric unit heater is satisfactory, using low velocities of air and rather close spacing of the heaters.

All successful greenhouse operators testify that great manual effort and exceedingly detailed attention must be applied to the air conditioning. There is a demand for very reliable automatic temperature control. One State University reports most favorable results with unit heaters and electric automatic control.

There is no question but that forced circulation hot water heating finds an especial field in greenhouse work, since the heaters may be almost

as small as those used with steam, and since the temperature of the heating surface may be controlled within such a wide range either by thermostats or by hand, without the constant adjusting of supply valves necessary when steam is used.

DAIRY BARN VENTILATION

The following are the salient requirements of dairy barn ventilation:

1. For good ventilation, there should be provided about 3,500 cu. ft. of fresh air per hour per 1,000 lb. of live stock weight.

2. A strong convective circulation is generated by the heat from the bodies of the stock, causing an upward movement toward the ceiling, about them, and a consequent downward movement at the walls.

3. Intake openings should be located in the walls near the ceiling so that incoming cold air, falling toward the floor, will accentuate the convective action induced by the heat within.

4. Outlet openings seem to function merely as exhaust ports, to relieve the interior pressure, and appear to have little influence on the direction of air currents. Hence, the spacing or distribution of outlet openings is rather immaterial, so long as the required aggregate area is provided. Area of outlet openings should be about one-third greater than intake.

5. It is better to take the air out at the floor than at the ceiling, since by the former there appears to be a larger volume of warm air held in the stable, which contributes to better temperature control.

6. The active circulation resulting from the down-flowing cold air entering at openings in the walls near the ceiling, cooperating with the convective action induced by the heat of the animals, effectually prevents condensation and keeps the air fresh and odorless.

DESIGN AND OPERATING DATA FOR MECHANICAL EQUIPMENT OF GOVERNMENT BUILDINGS

THE GUIDE, 1929, contains a chapter on this subject by N. S. Thompson of the Treasury Department. It contains data on the proportioning of plumbing fixtures, sewers, water services, fire protection, etc. It also gives rough approximations for determining the wattage for illumination, the number of elevators and the amount of heating surface in radiators. Data is given covering the average fuel and labor and maintenance costs for about 1,400 Treasury Department Buildings. The following is quoted therefrom:

Roughly, 6/10 lb. of coal per cubic foot is required per year for heating the ordinary building, while in buildings containing electric generating plants 1 lb. of coal per cubic foot is approximately correct for all purposes. Roughly, the maximum electrical demand in the large buildings averages 6/10 k.w. per square foot of gross floor area.

For boiler room repairs allow $2.00 per horsepower nominal rating.

For engine room repairs allow $2.00 per annum per kilowatt total nominal rating of generator.

For boiler and engine room supplies allow $2.00 per annum per horsepower of boilers installed.

Boiler room labor averages $2.00 per ton of coal fired, based on an 8 hour shift and 48 hours per week.

Ash removal averages 1/5 of a cubic yard to each ton of coal burned and is estimated to cost $1.00 per cubic yard to remove it.

The labor in a Federal Building containing an electric generating plant will roughly average the same as the cost of the coal, supplies and repairs to the boilers and electric generators.