

ASAE S501 APR1990 (R2015)
Uniform Terminology for Livestock Production Facilities



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Developed by the ASAE Systems Group; approved by the Structures and Environment Division Standards Committee; adopted by ASAE April 1990; reaffirmed December 1994, December 1995, January 2001, February 2006; January 2011, December 2015.

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1 Purpose and Scope

1.1 This Standard includes terms pertaining to livestock production facilities. Terms are categorized in the following sections:

2 General Structures and Environment

3 Farmstead Planning and Arrangement

4 Housing Environment

5 Structural Components, Materials and Design

6 Livestock

6.1 General

6.2 Beef

6.3 Dairy

6.4 Horses

6.5 Poultry

6.6 Sheep and goats

6.7 Swine



7 Feed and Water Equipment

8 Manure Handling

9 Domestic Water and Waste Systems

10 Farmstead Electrical

1.2 The Standard is intended to establish uniformity in terms associated with providing shelter, sustenance and comfort for livestock and to serve as a focal point for the development of useful new terms and definitions. Terms and definitions were adopted from related fields where applicable.

1.3 Related terminology is given in ASAE Standards: S292, Uniform Terminology for Rural Waste Management; S466, Nomenclature/Terminology for Livestock Waste/Manure Handling Equipment; S374, Terminology and Specification Definitions for Agricultural Auger Conveying Equipment; and EP444, Terminology and Recommendations for Free Stall Dairy Housing, Free Stalls, Feed Bunks and Feeding Fences.

1.4 Sources of additional livestock facilities terms are available from: Agricultural Plan Service (Canada Agriculture), Agricultural Editor's Association, National Pork Producers Council and Midwest Plan Service.

2 General Structures and Environment Terms

2.1 Apron: Extension (which is not necessarily attached structurally) of a grade-level floor (usually concrete) beyond the face of a building, feedbunk, or waterer.

2.2 Asphalt: A brown-black bituminous substance found naturally or as a residue in petroleum refining.

2.3 Barn: Roofed shelter for livestock (usually with at least one wall closed).

2.4 Barnyard: Outdoor pen area adjoining the barn used for livestock (see also Corral, Feedlot).

2.5 Bedded area: Livestock resting area which is covered with bedding — a dry absorptive material (see also ASAE Standard EP444, Terminology and Recommendations for Free Stall Dairy Housing, Free Stalls, Feed Bunks and Feeding Fences).

2.6 Building: Roofed and walled structure constructed for permanent use.

2.7 Building code: Guidelines/specifications written and published by inter-industry group that is adopted by local government for minimum safety and adequacy of buildings constructed in their jurisdiction.

2.8 Egress: A passageway out of a building (e.g., a fire exit door or a window), which could be easily opened to allow passage of people, animals, etc., in event of an emergency situation.

2.9 Extinguisher: A portable device used to extinguish a fire. Fire extinguishers are classed as A (ordinary wood or paper), B (flammable liquids), C (electrical), D (burning metals), or a combination of these classifications.

2.10 Gas

2.10.1 LP (liquefied petroleum gas): A pressurized (340 to 1030 kPa; 50–150 psi) mixture of mostly propane and butane gas. Codes for installation of LP gas systems are covered by the National Fire Protection Association, NFPA.

2.10.2 Natural: A naturally occurring odorless gas composed mostly of methane. The pamphlet which applies to natural gas installations in NFPA Standard 54, Standard for Installation of Gas Appliances and Gas Piping.

2.10.3 Biogas: A combustible gas produced by the anaerobic digestion of organic matter by bacteria.

2.11 Grate (grating): Parallel bars or grill over an opening, gutter or other receptacle, designed to pass liquids, grain and/or manure solids but not trash and to support animals, vehicles or persons.

2.12 Insecticide: A chemical designed to kill insects.

2.13 Limestone: Calcium carbonate. When crushed, it is a suitable base for livestock barn floors.

2.14 Rodenticide: A chemical designed to kill rodents.

2.15 RPM: Abbreviation for revolutions per minute.

2.16 Strain: Elongation per unit of length (e.g., mm/m, in/ft).

2.17 Stress: Any force causing or tending to cause a change in a structure. Force per unit area (e.g., Pa; lb/in²). Also, factors causing a change in animal function or behavior.

2.18 Suction: Pressure below atmospheric pressure.

2.19 System: A group of devices or an organization forming a single network to serve a common purpose.

2.20 Weatherproof: Constructed or protected so that exposure to the weather will not interfere with successful operation.

3 Farmstead Planning and Arrangement Terms

3.1 Barnyard: (See Barnyard 2.4)

3.2 Bedded mound: (See Mound)

3.3 Corral: Holding and handling facility for livestock, usually adjacent to pasture, feedlot or livestock barn (see also Barnyard).

3.4 Drylot: Feeding system where all feed is brought to the confined livestock (see also Barnyard, Feedlot, Open lot).

3.5 Electric fence: A fencing system using an intermittent electric charge.

3.6 Exposure distance: The distance between two buildings or a building and a hazardous location such as an LP gas tank or gasoline barrels.

3.7 Facility: A building with associated equipment and utilities for production.

3.8 Farmstead: The site at which the buildings and facilities for the farm are located.

3.9 Feedlot or feedyard: Unroofed enclosure with paved or unpaved surface, for confining livestock for growth or production on which growth or production of vegetation for livestock is not sustained (see also Barnyard).

3.10 Fence: Barricade to restrain livestock (either physically or by using electricity), screen views, control wind and snow, or divide space.

3.11 Fire door: A door assembly designed to contain a fire for a specified amount of time.



3.12 Livestock building: (See Barn)

3.13 Lot: (See Barnyard, Drylot, Feedlot, Open lot)

3.14 Open lot: Fenced outside pen (usually unpaved) with only shades and windbreaks for shelter (see also Barnyard, Drylot, Feedlot).

3.15 Pasture: A vegetated area where livestock graze and derive nutrients.

3.16 Plan: Layout of a structure or site viewed on a horizontal plane (see also Site plan).

3.17 Remodel: Renovation to change a facility's function and/or improve production or work efficiency.

3.18 Shelterbelt: Planting of trees in rows in a configuration designed to protect against prevailing winter winds and control snow drifting.

3.19 Shop: The farm building used for machinery and engine repairs, woodworking and tool storage.

3.20 Site plan: Drawing of the horizontal projection of a land area including buildings and other facilities (see also Farmstead, Plan).

3.21 Windbreak fence: Fence built primarily to reduce wind and snow effects.

3.22 Yard, or service yard: The general open area in the farmstead immediately adjacent to and between the buildings (see also Barnyard).

4 Housing Environment Terms

4.1 Air conditioning: The process and/or conditioner for modifying air temperature extremes, such as changing humidity, removing dust or odor, etc., to increase comfort and productivity (usually by mechanical means).

4.2 Air distribution or circulation: Pattern of air movement in a livestock building.

4.3 Air duct: Pipe, tube or passageway for conveying air.

4.4 Air inlet: Opening designed to supply fresh air to a facility, e.g., hole, slot, louver door, etc.

4.5 Air outlet: Opening through which exhaust air leaves a facility, e.g., hole, door, window, open ridge, louver or exhaust fan.

4.6 Axial flow fans: Type of fan where propeller-type fan blades rotate in a plane that is at a right angle to airflow.

4.7 BTU (British thermal unit): The amount of energy required to raise the temperature of one pound (0.454 kg) of water from 59°F to 60°F (15°C to 15.6°C) at standard barometric pressure; one BTU = 1.055 kJ.

4.8 Baffle: Usually flat plate for deflecting, retarding or regulating the flow of fluids or light, as in an adjustable ventilation air inlet.

4.9 Batt insulation: Fibrous insulation material packaged in bales and sized to fit between building framing members.

4.10 Blanket insulation: Fibrous insulation material packaged in rolls and sized to fit between framing members.

4.11 Blower: A device for producing a movement of air (often referred to as a fan).



- 4.12 Boiler:** An enclosed vessel to heat water for the purpose of developing hot water or steam under pressure.
- 4.13 Butterfly door:** Hinged sidewall panel, typically used as a ventilation air inlet or outlet. The hinge is normally located slightly above the center of its vertical height so that the door tends to be self-closing.
- 4.14 Catalytic heater:** (See Radiant heating)
- 4.15 Centrifugal blower:** Air-moving device constructed with many blades located on a cylindrical frame which is mounted so the blades are parallel to the axis of rotation.
- 4.16 Cfm:** Abbreviation for cubic feet per minute; one cfm = 0.000472 m³/s.
- 4.17 Chimney:** Vertical structure used with a stove, furnace or fireplace and enclosing a flue(s) to carry away products of combustion.
- 4.18 Circulation blower:** Air-moving device utilized within a building to provide air movement and circulation.
- 4.19 Circulation tube:** (See Distribution duct)
- 4.20 Cold barn:** Naturally ventilated barn, usually constructed with no or minimum insulation. No supplemental heat is provided and inside temperature varies with outside temperature.
- 4.21 Combustion products:** Residue resulting from the combustion of a fuel.
- 4.22 Condensate:** Liquid formed when a vapor condenses (e.g., as in an air-conditioning process).
- 4.23 Condensation:** Water vapor removed from the air and formed, in a liquid state, on a surface, in a building usually caused by poor insulation and/or high humidity.
- 4.24 Conduction:** Heat transfer through or between bodies in physical contact; involves no fluid motion.
- 4.25 Controlled or warm environment:** Insulated livestock housing where temperature, humidity, lighting, air movement, radiation, etc., are controlled by appropriate construction and environmental modifications.
- 4.26 Convection:** Heat transfer by fluid motion.
- 4.27 Culvert:** Large diameter pipe, usually 30.5 cm (1 ft) or more, used to convey water under a road.
- 4.28 Curtain wall ventilation:** Curtain of woven or solid fabric placed over a wall opening and adjusted up and down with a cable-and-winch arrangement, to vary the ventilation in a livestock barn.
- 4.29 Damper:** Adjustable plate or baffle to regulate flow through a duct.
- 4.30 Dead-air space:** Space in which there is little or no air movement.
- 4.31 Dewpoint temperature:** Temperature at which air is totally saturated with moisture.
- 4.32 Distribution duct:** Inflatable tube or rigid duct through which ventilation air is distributed in the building.
- 4.33 Draft:** Natural air movement with sufficient velocity, humidity, and/or cold temperature to cause discomfort.
- 4.34 Earth tempering:** Heating and/or cooling of air by moving it through a buried conductor, using the thermal mass of the earth to moderate air temperatures (see also Air conditioning).
- 4.35 Effective environmental temperature:** An index incorporating factors such as air temperature, humidity and radiation, which reflects the net total cooling or heating power of the environment.

- 4.36 Enthalpy:** The heat energy content of an air-water vapor mixture. Includes both sensible heat (indicated by dry-bulb temperature) and latent heat of vaporization (energy content of the water vapor).
- 4.37 Entrainment:** The mixing of ambient air with that exiting an air jet from an air inlet or distribution duct.
- 4.38 Environmental control:** (See Air conditioning, Controlled environment, Ventilation)
- 4.39 Evaporation:** Latent mode of heat transfer in which heat is absorbed during water's change in state from liquid to vapor.
- 4.40 Evaporative cooling:** The reduction of dry-bulb air temperature by the evaporation of moisture into the air. The heat required for the evaporation is supplied by the sensible heat loss of the air.
- 4.41 Fan:** (See Blower)
- 4.42 Fan hood:** Enclosure to protect a ventilation fan from weather, particularly direct wind and precipitation.
- 4.43 Flue:** Chimney liner through which combustion gases and smoke pass (see also Chimney).
- 4.44 Flue gases:** (See Combustion products)
- 4.45 Fogger:** System for dispersing water in fine droplets to provide evaporation for air cooling.
- 4.46 Fpm:** Abbreviation for feet per minute; one fpm = 0.0051 m/s.
- 4.47 Friction fit insulation:** Batt or blanket insulation with no paper backing, usually mineral fiber, held in place by friction against framing members.
- 4.48 Greenhouse effect:** Trapping heat inside a glass or a plastic enclosure, or trapping heat by the earth's atmosphere, by reducing convective and radiative heat loss.
- 4.49 Heat balance:** Condition in a structure or an animal's body in which incoming heat plus that produced inside is exactly offset by that leaving the body or structure.
- 4.50 Heat exchanger:** Device that transfers heat between flowing fluids without direct fluid contact; usually metal or plastic tubes with one fluid inside and the other outside.
- 4.51 Heat lamp:** An electric light used to provide radiant heat to newborn animals or to heat an object.
- 4.52 Heat loss:** Common term that refers to gross loss of heat from livestock or a building through surfaces and openings.
- 4.53 Heat pad:** A device used to conduct (by direct contact) heat, usually to some type of newborn animal.
- 4.54 Heat production:** Heat released during metabolism.
- 4.55 Heated floor:** Floor having some means for being heated from within, usually warm water pipes or electric cable.
- 4.56 Hot-air furnace:** Air heat system consisting of a furnace (combustion chamber and heat exchanger), a fan to move air across the heat exchanger, and a bonnet to which a duct system for air distribution may be attached.
- 4.57 Hot-water floor heater:** System comprised of a hot-water boiler with connected pipes embedded in floor for circulating hot water.
- 4.58 Hover:** Suspended cover of wood, canvas or other material, over an area in a pen or stall aimed at conserving heat and minimizing air movement for newborn animals; may include a heat source.

- 4.59 Infiltration:** Air leakage into a structure through cracks and joints (e.g., at windows and doors) caused by wind pressure and differences in indoor and outdoor temperatures.
- 4.60 Infiltration air:** Fresh air that naturally enters a building from the outside.
- 4.61 Insulation:** Material that retards or resists the flow of heat or electricity.
- 4.62 Intake (or inlet) velocity:** Velocity of air as it enters the building through an air inlet.
- 4.63 K-value:** A measure of a materials resistance to the flow of heat. The lower the K-value, the greater the insulation value (see also "R" value).
- 4.64 Latent heat:** Energy absorbed or released by a material when it changes phases (e.g., from solid to liquid); no temperature change is involved.
- 4.65 Light trap:** Device for allowing passage into or out of a room or container while minimizing transmission of light.
- 4.66 Loose-fill insulation:** Insulation installed by pouring or blowing into building walls and ceiling.
- 4.67 Louver:** Slotted ventilation opening allowing air flow while excluding rain, snow or direct light.
- 4.68 Lower critical temperature:** Effective environment temperature below which the livestock must increase heat-production rate to achieve heat balance.
- 4.69 Makeup heater:** Furnace, usually on an exterior wall, which adds heat to an incoming forced fresh air stream and exhausts, or distributes, it into the room.
- 4.70 Manometer:** Device for sensing pressure differences used to monitor performance of negative or positive pressure ventilation systems.
- 4.71 Mechanical ventilation:** Air movement through a building caused by electrically or hydraulically powered fans (see also Ventilation).
- 4.72 Mineral wool:** Fibrous insulating material of processed slag or rock.
- 4.73 Mister:** System for dispersing water in coarse droplets to provide wetting of livestock and structural surfaces (see also Fogger).
- 4.74 Modified open front building:** Building with one or more walls with large adjustable openings that may be closed or opened, dependent on weather conditions, to moderate building environment.
- 4.75 Moisture balance:** Condition whereby water vapor brought into a building, plus that released inside, is exactly equal to that leaving.
- 4.76 Moisture barrier:** Material which retards the passage or flow of moisture vapor (see also Vapor barrier).
- 4.77 Moisture content:** Amount of water in a material; expressed as a percentage of the oven-dry weight (dry basis) or the wet weight (wet basis) of the material.
- 4.78 Moisture proof:** Impenetrable to moisture absorption or passage of water in any form.
- 4.79 Moisture resistive:** Relatively impermeable to water.
- 4.80 Natural convection:** Heat transfer caused by the density difference between hot and cold fluids.
- 4.81 Natural ventilation:** Air exchange in structures caused by wind, temperature, and air density induced forces (see also Ventilation).



- 4.82 Negative-pressure (or exhaust) ventilation:** System in which air is forcibly vented from the building and in which make-up air from outside is drawn by negative pressure into the building to replace that vented.
- 4.83 Perimeter insulation:** Thermal insulation (usually rigid) installed onto or in a building foundation to reduce perimeter heat flow.
- 4.84 Plenum:** Enclosed air space such as an attic, basement, or box where pressure is approximately equal throughout for supplying air to ducts or air inlets.
- 4.85 Positive-pressure ventilation:** System in which outside air is forced into the building, which in turn forces out inside air by positive pressure (synonym: pressure ventilation).
- 4.86 “R” value:** A measure of a material's ability to resist the flow of heat; the inverse of “K” for one layer of construction; or the inverse of “U” for a complete structure; units are $\text{m}^2 \cdot \text{K/W}$ ($\text{ft}^2 \cdot \text{F/Bfu} \cdot \text{h}$).
- 4.87 RSI:** Resistance to heat flow, in SI units, $\text{m}^2 \cdot \text{K/W}$ (see also “R” value).
- 4.88 Radiant heater:** Device that emits thermal radiation that is directed at and received by absorbing materials, livestock and/or plants.
- 4.89 Radiant heating:** Heating primarily by thermal radiation.
- 4.90 Recirculation duct:** (See Distribution duct)
- 4.91 Ridge vent:** Opening along a roof peak for natural ventilation air outlet or an inlet for mechanical ventilation.
- 4.92 Sensible heat:** Energy applied to raise or lower the temperature of a material.
- 4.93 Shade:** Building or other object used to shield livestock from direct solar radiation; generally lightweight structure with solid or perforated roof and open walls to permit maximum air movement while blocking direct sunlight.
- 4.94 Short circuiting of air:** Air-movement patterns in which air moves directly from the inlet to outlet openings of a room instead of the desired uniform pattern.
- 4.95 Shutter:** Device for covering an air inlet or outlet that when shut, presents air from passing.
- 4.96 Silo gas:** Nitrogen dioxide formed during the fermentation of ensilage.
- 4.97 Slaughterhouse:** Building designed for processing livestock into edible meat.
- 4.98 Slot inlet:** (See Air inlet, Vent slot)
- 4.99 Space heat:** Heat added to room air with air circulation to provide more uniform temperatures.
- 4.100 Static pressure:** Pressure exerted in all directions by a fluid (e.g., air) at rest (see also Manometer).
- 4.101 Temperature stratification:** Air zones of different temperatures located from floor to ceiling; caused by nonuniform mixing of air (see also Space heat).
- 4.102 Tempered air:** (See Air conditioning)
- 4.103 Thermal break:** Insulating material between two heat conductors which reduces conduction heat transfer.
- 4.104 Thermal environment:** Those environmental components that affect the heat content of an animal's body.