INSULATING GLASS—STUDIES IN ITS USE IN MILK HOUSES AND DAIRY BARNS*

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Sanitary conditions in farm buildings where milk is produced may be improved by replacing present multi-paned windows with larger units of insulating glass which better transmit the light rays of the sun. The cross bars in present windows serve as chaff and dust collectors and also hold moisture that condenses on single glass. By using larger window areas in the south wall it is possible to use the heat rays of the winter sun for additional warmth. An overhang will shade out the hot summer sun, helping to keep interiors cooler.

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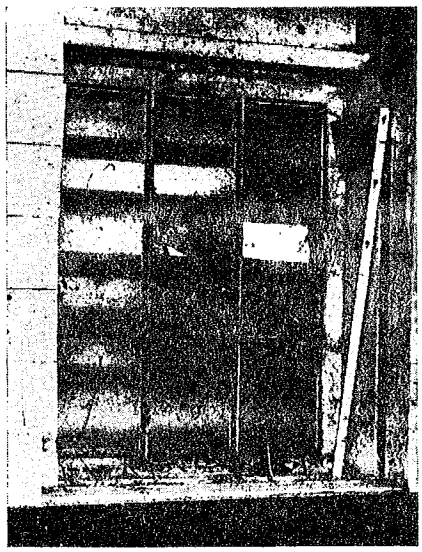
WINDOWS in many of our milk houses and dairy barns have not been improved to any great extent over the way they existed a quarter to a half century ago. Despite rigid health requirements which include provisions for improved daylighting, windows in many of these farm structures have not been planned and used to their greatest efficiency.

In the past these windows frequently have been responsible for a multitude of problems. They have been of little help in trying to maintain moderate temperatures and keep interiors comparatively dry. They have not let in sufficient daylight, especially in the winter months when daylight hours are at a minimum.

LIABILITY OF PRESENT WINDOW LIGHTING

Windows in milk houses, dairy barns, and other farm structures have not kept pace with daylight engineering developments for homes, and commercial and industrial buildings. Today most dairy building windows are a liability. These windows have from four to nine small panes of glass to a wall opening, creating a maintenance problem and cutting down the daylighting efficiency of the window. The cross sections are dust and dirt collectors. The chaff and dirt in turn absorb moisture, creating a breeding place for germs and causing the putty to loosen. The frames soon deteriorate unless painted frequently.

In the past dairy building windows have served a dual role—letting in daylight and serving as a means of ventilation. Daylighting efficiency has been sacrificed for the sake of ventilation. Today with electric power lines reaching practically every farm, it is possible to have mechanical ventilation. In many instances fixed, insulated windows may be used, resulting in better daylighting.



In winter especially, present dairy windows fail miserably in their primary function of daylighting. There are two reasons: First, the single-pane glass frosts over, so that at a time when the daylight hours are at a minimum, very little light gets through. Second, the single panes are so cold that air currents are set up. The warm air brings over moisture and dust which collects on the surface. The windows soon get dirty. The small panes and cross sections make washing difficult, with the result that they are seldom cleaned.

MR. W. EVERETT EAKIN, Director of Farm Research for Libbey-Owens-Ford Glass Company, is working with a number of agricultural colleges and farm leaders in improving the daylighting of farm buildings. For the past 10 years he has been engaged in agricultural relations work. Prior to that he was farm editor of several newspapers in Ohio and Michigan for 15 years.

Dairy windows too frequently are poorly planned in relation to the sun. There has been a tendency to place the windows to the east and west with the thought of getting the morning and afternoon sun into the interior. This practice, however, lets in too much of the hot summer sun and fails to take maximum advantage of the heat rays of the winter sun when additional warmth can be used to advantage.

ADVANTAGE OF LIGHT

To the layman, the primary benefit of daylight in the building is to make the interior light enough to see to work properly. There is authoritative evidence, however, that daylight passing through glass may be germicidal, even though very little of the ultraviolet rays pass through ordinary glass.

Studies of men in the medical and sanitation field have shown that daylight passing through glass in the absence of sunlight will kill some bacteria, although at a slower rate than the direct rays of the sun. In some instances direct sunlight was about ten times as potent as diffuse daylight.

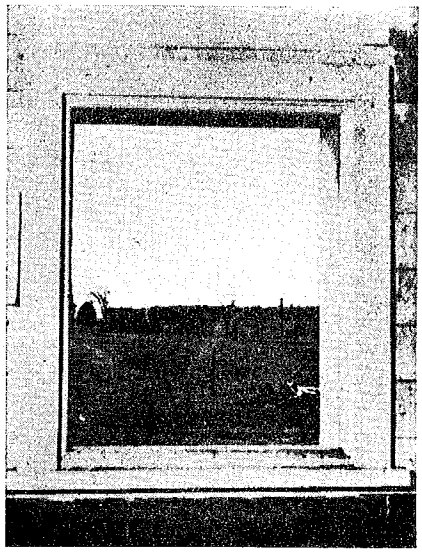
As far as the ultraviolet light is concerned, this is present to the greatest extent in the summer months at a time when livestock is outdoors much of the time. Little ultraviolet light is present in the winter sunlight, and especially during the early morning and late after-

noon periods when the sunlight passes through windows.

Preliminary studies also indicate that daylight affects the fertility of cows. In some instances cows kept in poorly lighted barns have had poor breeding records while those in well lighted buildings required less trips to the bull. The USDA's Agricultural Research Center in Beltsville, Md., used a little light trickery to reverse the normal breeding season of female sheep and goats with the result they produced their young in the fall instead of the spring. Actual changes in the heat periods were brought about by changing short winter days to long ones with artificial light, and then shortening them abruptly in the spring, when normally days are longer.

INSULATED WINDOWS

Value of insulated windows to cut



down heat loss has been recognized in the past by many agricultural leaders who recommended storm sash. Farmers, however, never would be bothered by putting up and taking down the storm sash.

Development of Thermopane insulating glass provides an answer to this problem of insulating windows. Thermopane basically is two panes of glass with a pocket of dry air sealed in by a metal-to-glass bond. Because the moisture has been taken out of the air pocket of this insulating unit, condensation does not take place between the two panes. This unit was perfected by Libbey-Owens-Ford Glass Company primarily for the home and normally is made with polished plate glass for clearer vision.

For dairy buildings and other farm structures the same serviceable unit may be made with less expensive sheet glass. It is available in nearly 100 standard sizes including several especially suited for farm buildings. Thermopane is not a new product. Units made more than 10 years ago are still giving perfect service.

Thermopane is one of a very few building products that carries an extended guarantee. This guarantee is written for a five-year period against any defects in the seal. Over a five-year period it is felt the maximum and minimum temperatures for any given locality will be experienced.

Thermopane windows provide as much insulation as a comparative amount of structural insulation. In addition they admit daylight and, in some instances solar heat. Under conditions which exist in livestock and poultry shelters, insulating windows often are considerably more efficient in letting daylight and sunshine into the buildings than ordinary single-glazed windows.

Observations of installations made for the purpose of comparing the performance of insulating windows with the conventional single-paned ones, both used under the same conditions, have shown that insulated windows gather dirt less rapidly, stay freer of condensation, and are much less apt to frost over than ordinary windows, including those protected with storm sash.

Accumulation of moisture and dirt on the glass surfaces of storm sash in the space between the panes decreases the daylight efficiency of the storm sash, especially on cold days. In the insulating type window, the sealed space filled with dehydrated air prevents this difficulty. The insulated window lets in more light per square foot of window area under actual use than ordinary windows because they stay cleaner. Also, more window area can be used without increasing the heat loss when ordinary windows are replaced. At the same time, drafts caused by cold window surfaces are minimized.

ORIENTATION TO LIGHT

Position of the windows in relation to the sun greatly affects the amount of solar energy that will pass through them. The more nearly the plane of the window approaches a perpendicular to the sun's rays, the greater will be the heat input. In the summer at our latitudes the sun rises north of east and sets to the north of west. In the summer east and west windows may be objectionable because in the early forenoon and late afternoon unwanted solar energy enters the building through them. West windows are most troublesome in this respect, because the solar heat comes through at a warmer time of the day.

Insulated windows properly oriented for sun control make it possible to keep buildings warmer in winter and cooler in summer. Likewise such windows help to maintain a higher winter temperature and by so doing help to increase the efficiency of the ventilating system in reducing the moisture problem. This is true inasmuch as the warmer air will hold more moisture, thus taking out of the building more moisture to a given volume of air moved.

The solar principle of heat which has swept the building field now may be applied to milk houses, milking parlors, and the dairy barn itself.

There are four fundamental factors of solar design: (1) Window orientation to face south to obtain the heating benefits of solar radiation in winter. (2) Larger windows which are necessary to provide proper entry of solar radiant energy in winter months. (3) Insulated glass to cut down on the heat loss. (4) Sun control which is achieved by the use of permanent or temporary roof overhangs, visors, or other means of controlling shadow areas on the windows so that sunlight can enter during cold weather and be shut out during the hot summer months.

At a recent solar energy symposium held at Massachusetts Institute of Technology, it was pointed out that from 23 to 46.5 percent of the heating requirements of a M.I.T. research house were furnished by solar energy, using triple Thermopane windows. Possibilities of storing solar energy for delayed use were pointed out. Three methods now are being used in test houses, one employing Glaubers salt, the second, using water, and the third, crushed stone.

To date the idea of storing solar heat for delayed use has not been applied to milk houses, milking parlors, and other dairy buildings, although as this procedure is developed it holds definite possibilities for farm structures. With warmer inside temperatures, and greater glass area, the sanitary conditions of these buildings should be improved.

In the past two years several milk houses, milking parlors, and dairy barns have been designed to take advantage of immediate solar heat, including those on the farm of the late H. E. Babcock of Ithaca, N. Y., and the Hugh Highsmith farm near Fort Atkinson, Wisc.

Solar heat helped noticeably in drying the interiors and warming them during the day in winter. It was found that floors could be dried quickly by properly ventilating during the middle of the day after they had been scrubbed. On most days solar heat was sufficient to make inside temperatures comfortable during evening choretime. During colder weather supplemental heat was found desirable to prevent freezing on very cloudy days and at night, and especially to warm milking parlors for the early morning milking.

A new solar-type milking parlor and milk house recently were completed on the O. P. Eichelberger farm near Frederick, Md. Dr. Robert F. Gaddis, Chief of the Division of Dairy Farm Inspection for the Bureau of Milk Control, Baltimore City Health Department, has been cooperating in observing the window performance including the improved daylighting and use of solar heat. There are fifteen windows, each 72" by 42", the window area being equal to 20 percent of the floor area in comparison with the required 10 percent.

In another study near Madison, Wisc., a critical moisture problem was corrected and daylighting improved considerably in a bank type barn where the old windows were replaced with 160 square feet of insulating glass and a mechanical ventilating system was installed. During the past winter a stable temperature of about 58° F. was maintained with a relative humidity of about 55 percent. This averaged 10 to 15 percent lower than ordinarily encountered in dairy barns.

The possibilities of daylight engineering and solar heating open a new frontier in the design and sanitation of farm buildings. The possibilities for the use of this natural resource for the benefit of man and animal are undeveloped.

ADOPTION OF THE USPHS RESTAURANT SANITATION ORDINANCE

The recommended restaurant ordinance (or one based thereon) is in effect in 675 municipalities and 346 counties located in 42 States and Alaska. It has also been adopted as State regulations in 30 States and the District of Columbia, in 20 of which it is enforced State-wide. It is in effect in areas with a total population of over 82,000,000. Included are 49 cities of over 100,000 and 43 cities between 50,000 and 100,000 population.

A summary of the type of ordinance now in force is tabulated below.

		Type of Ordinance		
	Total	Grading	Non-Grading	Not known
States	31	8	23	0
Municipalities	75	378	287	10
Counties	346	148	186	12

The full report can be secured from the Division of Sanitation, Milk and Food Branch, Washington, D. C.

H. N. CALVER ATTENDS LONDON CONFERENCE

Homer N. Calver, Secretary of the Public Health Committee of the Paper Cup & Container Institute, and Editor of the Health Officers' News Digest, has been designated Special Advisor to the Food Division of Federal Civil Defense, and has gone to London with an official Government mission which is conferring in London with representatives of the Government of Canada and the United Kingdom on the food aspects of civilian defense.

Mr. Calver has been assigned to both the emergency feeding and scientific sections of the conference.

MARKET MILK AND ICE CREAM MEETINGS TO BE HELD AT PURDUE

Two one-day dairy meetings will be held in April, 1952, at Purdue University according to an announcement by Professor H. W. Gregory, Head, Department of Dairy Husbandry. These meetings are as follows: Market Milk Plant Operator's Conference, April 23 and Ice Cream Institute, April 24.

The conferences are a continuation of the series held annually in recent years. Specialists from the dairy industry and universities will be on the programs. Ice Cream samples submitted by plants to Purdue for analysis and scoring will be examined and discussed as a part of the ice cream meeting. Foremost problems relating to the processing and distribution of bottled milk will be discussed at the market milk conference.

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