Dairy Cows in Hot Weather

temperatures above 80° F reflected in both lowered production and the solids-not-fat content of the milk

W. M. Regan

The producing dairy cow seems poorly equipped to stand hot weather—especially when in full production.

In the Animal Science Building on the Davis campus there is a controlled temperature room equipped to house two cows comfortably. Various combinations of temperature and humidity may be maintained in the room for any length of time to duplicate various climatic conditions of California.

Ten high-producing dairy cows—two pairs of Jerseys, two pairs of Holsteins and one pair of Guernseys—have been studied in the room under varying climatic conditions for an entire lactation period.

An accurate record has been kept of the feed and water consumption, the amount and composition of the milk produced by each cow, together with the pulse, breathing rates, and the body temperature.

As the temperature of the room was gradually raised from freezing to 80° F the only notable change was in the breath-rate which about doubled each time the temperature was increased 20°. When 80° F was reached with the Holsteins and 85° F with the Jerseys and Guernseys, the body temperature began to rise, the appetite began to fail, the milk production declined, while the solids-not-fat content of the milk was lowered, and the rennet coagulation time lengthened.

Other workers have shown that the producing dairy cow can withstand low temperatures without any material discomfort and without any loss in the amount of milk produced or in the economy of production. The results of the Davis studies indicate that the producing dairy cow is less able to withstand high temperatures.

Because of the necessity of increasing California's output of dairy products to meet the demand of the state's growing population, dairymen in the interior valleys should consider making provisions for keeping their cows cool. In that way they can avoid the loss in production that accompanies the occasional summer hot spells when the nights do not cool off. The cows are able to withstand midday temperatures of from 90° F to 100° F if the nights are cool.

The following are suggested as practical measures for keeping cows cool: *1*, a convenient supply of cool drinking water, either from a running stream or from automatic drinking cups through which each cow draws her drink from a buried pipe; *2*, adequate shade; and *3*, available lush green pasture. Experiments by the College of Agriculture show that the temperature on a hot day is 10° F lower above an alfalfa or sudan field than it is over a dry corral.

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Sheep Production Experiments

effectiveness of hormone injections studied in breeding program for spring lamb market

Robert F. Miller

To market lambs in April in California, it is desirable to breed ewes so they will lamb in November and December.

In most mutton breeds the nonpregnant ewe has a sexual season of approximately six months followed by a barren—anestrous—period of equal duration.

Some breeds such as Merino, Rambouillet and Dorset have a shorter anestrous period. Southdown, Shropshire, Romney, Suffolk and Hampshire ewes have a sexual season beginning in September and extending through February. Some Hampshires come into sexual heat during August or even the latter part of July. There is a considerable variation.

Extensive studies have been made in effectiveness of the induction of estrus in sheep by means of hormone injections.

Pregnant mare serum—PMS—filtered and treated with merthiolate, was the form of equine gonadotrophin employed.

The estrogens, estradiol benzoate and stilboesterol; the androgen, testosterone propionate were used.

Early studies indicated that ovulation without heat resulted when anestrous ewes were given a single injection of PMS.

Of the 170 ewes given two injections of PMS, 58 or 34% came into heat, 53 were bred and 17 conceived. Only six of the 43 ewes receiving three injections come into heat and were bred, but only two became pregnant.

Some of the data obtained indicate that estrus may be induced later than 10 days after the injection. In 1934, 15 purebred Shropshire ewes were given a single injection of 200 I. U.—International Units—PMS on July 31st. Nine of these came into estrus between August 18th and 28th and six of the nine lambed to matings at this time.

A report of a field experiment in 1938 by other workers states a single injection was quite effective. The ewes were injected on May 9th. Lambing should have occurred the first of October. Actually only 5% lambed by November 1st.

By November 12th, 47% had lambs as compared to 10% of the 296 uninjected controls. There is good evidence that a single injection may hasten the onset of the sexual season.

In 1937–38 Shropshire ewes were given 750 I.U. PMS on July 9th and again July

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26th. Seven of the eight ewes came into estrus within 48 hours after the second injection, but none became pregnant though mated to a fertile ram. This dosage is within the super-ovulation range resulting in many ruptured or unruptured follicles which may be of doubtful value.

In contrast, a group of Hampshire ewes were treated with a 600 I.U. dose in 1939. Following a single injection, several ewes were sacrificed later and as many as nine freshly ruptured follicles per ewe were found. Some had only ripe unruptured follicles. Others of the same group were mated after a second injection and eight of the 16 became pregnant. Three of the eight had triplets, three had twins, and two had singles.

On the average, only 32% of ewes receiving two injections came into estrus after the second injection, but some experiments were more successful. For example, in 1944, 26 Southdowns were given 400 I.U. PMS on July 27th and 320 I.U. on August 13th; 19 of the 26 came into estrus within 10 days after the second injection, were bred, and 13 became pregnant.

Early experiments with estrogen and PMS were not successful in producing a normal estrus. When the dose of estrogen was too low—100 to 400 Rat Units—heat was not regularly induced, whereas if the estrogen level was too high, ovulation was inhibited.

In June, 1942, six Hampshire ewes received 100 R.U. of estrogen daily for 15 days and then PMS six days after the last injection of estrogen. Four other ewes received identical treatment except that the dose of estrogen was 400 R.U. daily. Six of the ten ewes came in estrus during the estrogen treatment, but only one after the injection of PMS when ovulation is expected. Five of these were force bred 72 hours after the injection of PMS, but none became pregnant. The five remaining ewes were sacrificed, but only one had ovulated.

Progesterone—the corpus luteum hormone—has been shown to inhibit estrus in the rat when large amounts were given.

The Effect of One, Two, and Three Injections of 125 to 750 I.U. of Gonadotrophin on the Induction of Estrus. Injections Were Given at 15- to 17-Day Intervals

Treatment: Injection	No. of Animals Treated	No. Coming Into Estrus	No. of Ewes Bred	No. of Ewes Which Conceived
Single	118	8	8	None
Two	170	58	53	17
Three	43	6	6	2

The suppression of estrus during lactation has been attributed to the activity of the corpora lutea. While some encouraging results were obtained in using the progesterone in conjunction with PMS, on the whole progesterone was not effective in inducing estrus or sexual receptivity.

In a study of the effect of androgen—testosterone—along with PMS, androgen was found to have a pronounced effect upon sexual responsiveness in the ewe. Fertile matings after the treatment with androgen were less than when PMS alone was administered—in two injections. Nevertheless it showed some promise in that about 50% of the ewes receiving 50 milligrams of androgen plus PMS became pregnant.

Although estrus was induced by several methods during the course of these studies, a complete physiological response was not produced regularly. The conclusion was reached that either a proper balance of hormones has not been attained, or unknown factors are involved. Because good results are obtained only irregularly, more research on the subject is desired before specific recommendations can be made.

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POULTRY

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the head is discarded prior to cooking the bird.

A word needs to be added about the possibility of adding estrogens to the feed. This method would have the advantage over pellet implantation of not requiring individual handling of the birds. Diethylstilbestrol is relatively ineffective when fed but some similar compounds produce fair fattening when mixed in the mash. Of these, some are unsuitable for commercial use due to undesirable side effects, but one, dienestrol diacetate, appears to have considerable promise as an estrogen that can be fed. Development of this material for commercial use has not yet been completed, however, and for the present diethylstilbestrol pellets are the only form of estrogen treatment available to the poultry industry.

The question of applying estrogen treatment to turkeys presents certain complexities.

The major interest has been in attempts to finish turkeys for market earlier than would otherwise be possible, but the results of trials have not been encouraging.

In spite of the suppression of the testes, the birds' aggressiveness is not quieted and sexual activity even tends to be increased. Some torn backs may result.

Turkeys respond with less dramatic fat deposition than is usually obtained with chickens, and the response is not improved by increasing the treatment period. In fact, lengthy trials usually resulted in birds of poorer quality than the controls. In a report of a recent trial miximum improvement was obtained only after two weeks of treatment. Some improvement in total weight was also observed. The advantage was lost in birds held beyond that time.

These results have not been entirely confirmed here, however, and at present estrogen treatment is not recommended for turkeys.

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DAIRY

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3. Once a cow has had *Streptococcus agalactiae*, her udder has been damaged. Even though apparently clean after treatment, the disease frequently reappears.

4. Regular testing, particularly of the disease-free cows, consistently milking infected cows last, and treating only dry or acutely infected cows is essential.

The San Diego County Livestock Department, coöperating with the Agricultural Extension Service analyzed monthly production and mastitis testing data on a 300-cow dairy.

In this herd, tests were made monthly for butterfat production and for mastitis. The production of all mastitis-free cows was averaged and compared to the average of the infected animals. Over 5,000 production records were included in the study.

All cows were handled and fed the same. The disease-free cows averaged 4.75 pounds butterfat per month more than the infected animals. This might be considered an average herd, starting with about 30% infection. Comparatively few of the cows had acute mastitis—most of the infected ones were hidden carriers. On the last test the dairy owner had less than 5% of his cows shedding *Streptococcus agalactiae.*

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