## Inhibitory Action of Artificial Light on the Sexual Season of the Ewe

RECENT studies on photoperiodicity have been undertaken in an attempt to hasten the onset of the sexual season of sheep[1-4], to extend the lactation period in goats, to accelerate the onset of œstrus in thoroughbred mares and to advance or prolong the egg-production season in pheasants[5]. Attempts to inhibit the sexual season are of considerable importance in solving certain problems of refractoriness of the gonads in the physiology of reproduction. Yeates[3] has shown that the cessation of the sexual season of Suffolk sheep occurs after 14–16 weeks exposure to an increasing plane of artificial light.

Two series of experiments were carried out to inhibit the sexual season of the ewe by artificial light. During the hours of daylight, artificial light was not used ; control animals were available and ochred vasectomized rams were used for detecting œstrus. The term 'latency of cessation' denotes the period elapsing from the start of light treatment to the date of the last œstrus exhibited.

(*A*) Grade Suffolk ewes were exposed to light continuously from November 1, 1950. They were previously running on pasture under natural conditions of daylight until their sexual season had reached its height (per cent œstrus = 100). The experimental ewes were experiencing œstrus regularly but came off season some eight weeks earlier than the control. The date of cessation in the experimental group ranged from January 4 to February 1, with a mean of January 21 ($21 \pm 1 \cdot 7$), while in the control group the end of season ranged from February 7 to April 20, with a mean of March 17 ($76 \pm 5 \cdot 7$). The latency of cessation in the experimental group was twelve weeks, and the control ewes came off season when the natural daylight length was twelve hours. The length of cycle (17·4 days), duration of œstrus (36 hr.) and the frequency of silent heat (5 per cent silent heats expressed as a percentage of the total number of heats theoretically possible) were not significantly different in experimental and control groups.

(*B*) Œstrous ewes of six pure breeds (Blackface Mountain, Border Leicester, Dorset Horn, Romney Marsh, Suffolk and Welsh Mountain) and of one first cross (W.M. × D.H.) were exposed to a constant daily ration of 16 hr. light : 8 hr. darkness (long days) starting on September 4. They were previously subjected to a constant daily ration of 8 hr. light : 16 hr. darkness (short days) for some twenty weeks. The latency of cessation ranged from 6 to 24 weeks, according to the breed. The Dorset Horn and its cross showed the longest latency of cessation, whereas the mountain breeds (Blackface Mountain, Border Leicester and Welsh Mountain) had the shortest, and in Suffolks it was nine weeks. The date of cessation of the sexual season was on an average fifteen weeks earlier than the control.

It is concluded that the previous light treatment may control the maintenance and the cessation of the sexual season ; and that either the presence of darkness as such or the contrast stimuli of the change from light to darkness is essential for the continuation of the sexual season of the ewe. The latency of cessation is also controlled by other factors besides light. Breeds of sheep which originated near the tropics have a shorter time-lag reaction to light than those breeds which originated nearer the poles. It seems that younger animals are more readily influenced by artificial light than adults. Individual differences are also shown in the response to light. The time of the year at which the light treatment starts determines the latency of response. The previous light environment is an important factor due to the residual effect of light. Both the ratio and rhythm of light control the speed of the response.

The mechanism of the light-stimulating action on the gonads is believed to be via the hypophysial-portal system[6], while the mechanism of the light-inhibitory action has not yet been elucidated.

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## Control of Cauliflower Mosaic Virus

Caldwell and Prentice[1] emphasized in 1942 the value of seed-bed isolation in the control of cauliflower mosaic virus, which in Devon has seriously reduced yields of broccoli. Experimental work at this College has shown that infection in the seed-bed can still be the main cause of reduced yield, even when conditions favour extensive spread of virus in the field after planting.

Three varieties of broccoli, Extra Early, *A*6 and *B*1, were grown in two seed-beds, one adjacent to an infected seed broccoli crop and one half a mile from any *Brassica* crop. The seedlings were planted out in replicated plots. Although practically all the plants in the experiment developed virus symptoms before they were cut, an analysis of the results shows that plants from the isolated seed-bed gave both heavier yields and higher percentages of marketable heads. As no difference in varietal susceptibility was observed, the three varieties are treated together in the following table.

COMPARISON OF YIELDS FROM THE TWO SEED-BEDS

| Seed-bed | Per cent of curds of diameter more than 2 in. across | Av. total yield per plot (lb.) |
|---|---|---|
| Isolated by ½ mile | 81 | 49·5 (s.e. ± 4·7) |
| Not isolated | 44 | 36 (s.e. ± 2·12) |

Fortnightly recordings of the plots showed that there was considerable variation in the expression of symptoms. Plants infected in the seed-bed developed vein-clearing followed by vein-banding symptoms[2], and secondary infections of a similar type were observed in the autumn. From December onwards,