

TECHNICAL BULLETIN



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Optimizing Egg Size in Hot Weather

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Every summer the same thing happens. Hot weather hits suddenly, layer feed consumption drops, and production and egg size suffer as a result. It's a predictable sequence of events, yet we seldom plan ahead for avoiding these consequences.

The most severely affected flocks are those just coming into production when the hot weather arrives. That is a precarious time in the life of a layer anyway, because they have difficulty consuming sufficient feed to meet their nutritional demands, even in normal conditions. Adding the effect of heat stress at this time can only make it worse.

What are some actions that can be taken to better prepare young flocks to maintain production and egg size during hot weather? This paper will concentrate on the management factors affecting egg size.

Body Weights

The single most important factor for achieving egg weight is the pullet's body weight maturity. Summers and Leeson demonstrated this relationship (*Poultry Science* 62: 1155-1159, 1983), which is summarized in the following table:

<u>18 Week Body Weight</u>	<u>Egg Weight (g) 19-25 Weeks</u>
1100 g (2.4 lb.)	46.9
1200 g (2.6 lb.)	48.4
1280 g (2.8 lb.)	48.8
1380 g (3.0 lb.)	49.7

For every 0.1 pounds (45 g) heavier the average body weight at 18 weeks, egg size increased almost 0.5 grams (0.4 pounds per case).

Of course, body weight is affected by many management factors, including disease, lighting, space allotment, and beak trimming, but the most direct influence probably comes from nutrition. In 1989 Summers and Leeson demonstrated that pullet growth is most responsive to protein in roughly the first half of the growing period and to energy in the later half (*Poultry Science* 68: 546-557, 1989). We have learned that energy intake can be the most restrictive nutrient limiting growth. With today's feed efficient varieties, we sometimes need to encourage consumption during growing by keeping house temperatures a little cooler, running feeders more often, and allowing more space per bird. Also, higher density diets, especially energy, will allow the pullets to consume adequate energy and other nutrients on a lower level of feed intake. (See management guide recommendations.)

Rate of Maturity

Another way to improve body weights at maturity is by delaying maturity. Genetic selection has been advancing the rate of sexual maturity by about one day per year. Early maturity can be a valuable trait if the necessary body weight can also be attained. However, if at least standard body weight is not present at 18 weeks, light stimulation should be delayed until that target weight is achieved.

A more effective approach to purposely delay maturity and increase egg size is to use a step-down lighting program during growing. A test

performed in Germany (1990-1991 Poultry Performance Test for Haus Düse, 25th Test Westfalen-Lippe Agricultural Dept.) compared a control lighting program of a constant eight hour day length from three to 16 weeks and stimulation beginning at 17 weeks to a delay-type program with step-down lighting from eight to 13 weeks and stimulation beginning at 19 weeks. Production was delayed in the step-down program by 10-11 days, and egg numbers were reduced by seven to eight per hen-day. The advantage was that average egg weight for 52 weeks of production was increased by 1.7 grams and 1.5 grams for white and brown respectively. Total egg mass was not significantly different between the two lighting programs. This demonstrates that producers can use lighting to achieve their objective, either more eggs of a smaller size or fewer eggs of a larger size.

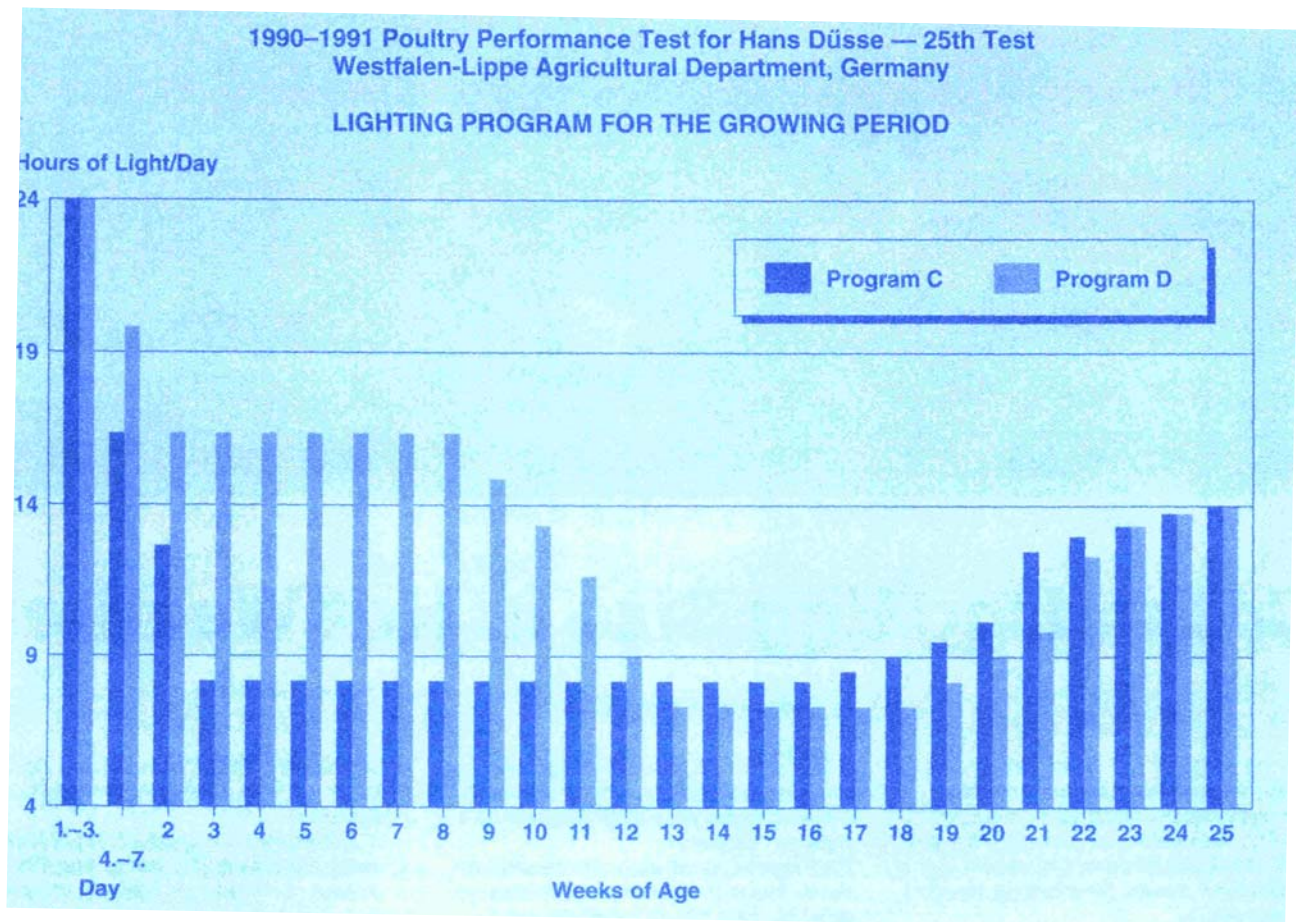
Another newer method for delaying maturity and improving early egg size is the “pre-lay pause.” With this technique, feed is withdrawn for five days when the flock reaches 10% production.

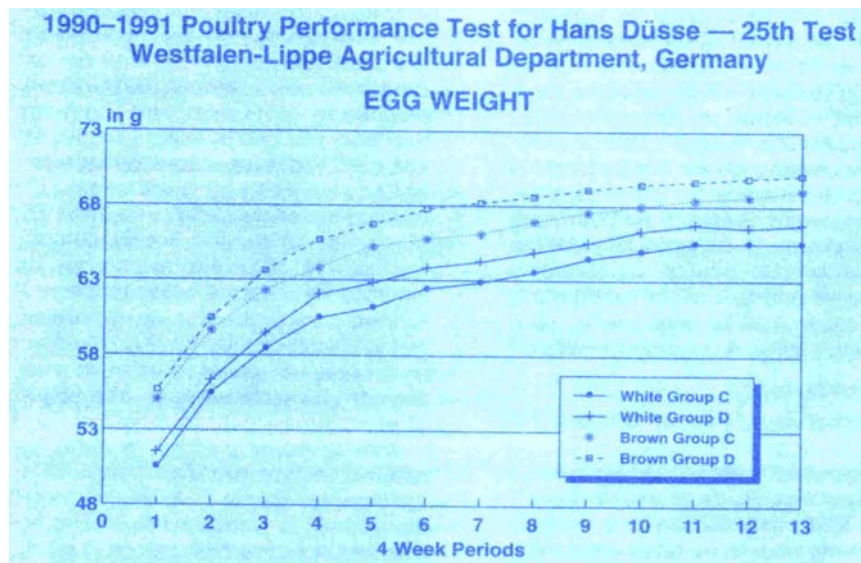
In field trials, at the University of Georgia, Charles Strong found that egg weight improved 0.7-1.5 grams per egg (0.6-1.2 pounds per case) in the first half of the laying cycle and only tow eggs per hen housed were lost by the delay in maturity. (*Journal of Applied Poultry Research* 1: 56-60, 1992). This management technique seems to be gaining in popularity. Some method of delaying maturity, either step-down lighting or a pre-lay pause, should be considered for spring-grown pullets to counteract the naturally increasing day length, and to improve egg size during the ensuing hot summer months.

Nutrition In Early Lay

Egg size in early lay seems to be nutritionally influenced most by dietary protein and fat levels (see November, 1991 *Hy-Line Review*).

Don Bell and Ralph Ernst reported in the March 1992 *California Poultry Letter* that one exceptional layer flock in their state maintained egg size 5-6 pounds per case (6.3-7.5 grams per





1990-1991 Poultry Performance Test for Hans Düsse — 25th Test
Westfalen-Lippe Agricultural Department, Germany

Laying Performance

Egg Color Types	Age at 50% Production	Accum. Eggs		% H.D. Lay	Egg Mass		Avg. Egg Weight (gms)	
		/H.H.	/H.D.		/H.H. kg	/H.D. kg		
Avg. White Groups C	153	308.0	313.2	87.0	19.00	19.31	61.7	} +1.7 g
Avg. White Groups D	164	302.9	305.8	84.9	19.19	19.38	63.4	
Avg. Brown Groups C	152	308.2	310.4	86.2	20.08	20.23	65.2	} +1.5 g
Avg. Brown Groups D	162	298.7	302.7	84.1	20.03	20.18	66.7	

egg) above breeder standards from 18-40 weeks by feeding about 30% higher methionine and 15% higher methionine + cystine levels than recommended by the breeder.

Kavous Keshavarz of Cornell has reported that in lightweight pullets, increasing crude protein from 17% to 22% increased egg weight about 1.0 grams. Also, using 3-4% fat to replace an equal number of calories from carbohydrate increased egg size about 1.0 grams. The two effects of protein and fat seem to be additive, so they can be used together for maximum response.

Vegetable oils, or blends containing vegetable oil, contain high levels of linoleic acid which is especially beneficial for improving egg size. William McKean reported in the January, 1990 *California Poultry Letter* that a daily intake of 1100 mg linoleic acid per hen per day optimized egg size and production. Research at the Harper Adams College in the United Kingdom demonstrated about a 1.0 gram larger egg size from a diet containing 3.0% linoleic acid compared to 1.5%.

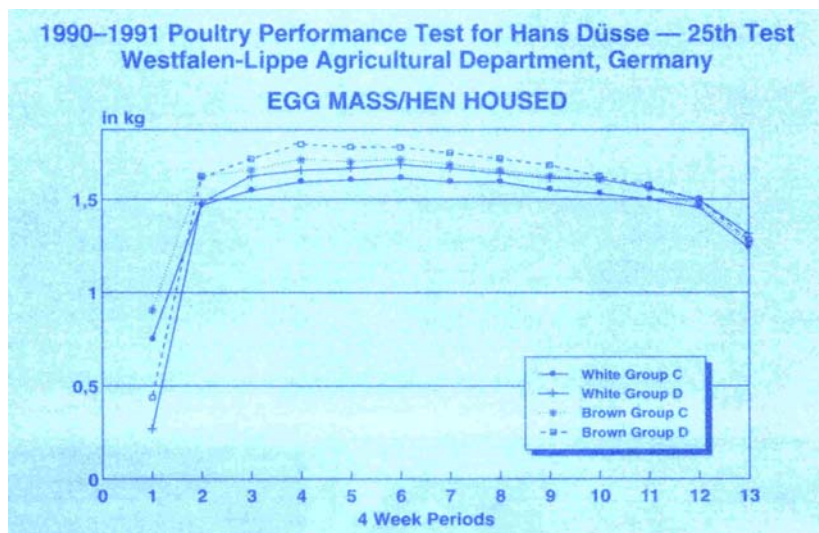
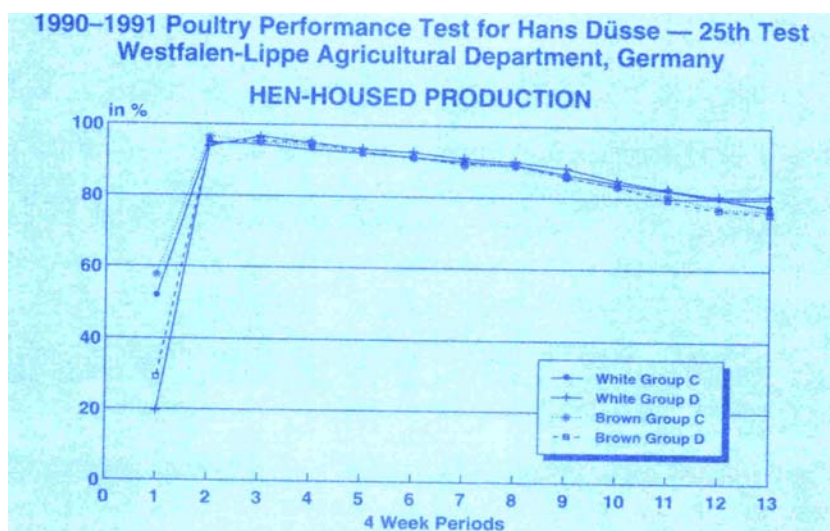
Besides increasing the nutrient density of the feed, anything we can do to stimulate consumption during this time will be helpful. Feeders should be run frequently to keep feed readily available and to stimulate the birds to get up to eat. Hourly runs to stir the feed are helpful. House temperatures should be kept cooler (70-75°F./21-24°C.) in early lay compared to later in lay (75-85°F./24-29°C.). During heat stress, the house should be cooled as much as possible at night to allow the birds to temporarily recover and lower their body temperature. More of the artificial lighting should be given during the cooler hours of the day. A supply of cool water will help keep the birds cool and stimulate more feed consumption. Also, keeping the air moving with fans inside the house will help the birds stay comfortable by removing the hottest air next to their bodies (wind-chill effect).

Feed that is too high in calcium early in lay may pose palatability problems and cause the birds to reduce consumption. We recommend keeping calcium no higher than 3.85% prior to peak, unless

palatability can be improved by using meat and bone meal or fat in the ration.

Conclusion

It is obvious that egg size is manageable through controlling body weight, rate of maturity, and nutrition. Now is the time to plan ahead for hot weather peaking flocks to improve early egg size and optimize profitability.



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