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The Effect of Color on the Feed Preferences of Chickens

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Abstract: This experiment investigated the possibility of using color to manipulate feed consumption. Two trials were conducted. For the first trial dyed feed was used. Birds were placed in pens and given yelllow, green, and red feeds to choose from. Consumption was measured over a period of two weeks. Results for trial 1 yielded no significant differences in feed preference.

In trial 2, birds were placed in a battery and red, green, blue, and white fluorescent lighting was used to illuminate feed troughs. The feed consumptions were measured for a period of three weeks. Preference for the feed illuminated by the white light was found to be significant during the first week of the trial and in overall consumption. Overall feed preference for the feed illuminated by the blue light was marginally significant. The results of both trials indicate that the effect color has on feed preference in chickens is limited.

Introduction

The poultry industry's increasingly competitive market requires companies to constantly find new ways to reduce overhead through increasing efficiency. One of the fundamental areas of poultry production which has been the focal point of much research and discussion is feed conversion. With ever increasing corn prices, which is the primary ingredient in chicken feed, poultry companies incur a great expense before their product even reaches the processing plant. By improving their feed conversion ratio through implementation of more efficient feeding methods, the industry could better absorb rising corn prices. If birds could be found to respond favorably to certain colored stimuli while feeding then methods could be developed to enhance the efficiency of current feeding practices.

Much research has gone into the study of the avian eye and its ability to distinguish between different colors within the electromagnetic spectrum. It is known that the presence of orange, red, yellow, or clear pigment oils within the ocular cone of the avian eye act as filters which allow birds to distinguish between objects by "intensifying similar colors and reducing the discrimination of others" (King and McLelland, 1976). For example, the yellow pigment would remove much of the blue from a background, thereby increasing the contrast between an object in the sky. Or the red pigment would help to remove the green from a background increasing the contrast between an object and the grass (King and McLelland, 1976).

Relatively little research has considered the effect of color on the feeding habits of the avian species. The earliest work conducted on avian feeding habits in relation to differing colors was done by Hess in 1912. By sprinkling grain onto a white floor which had the color spectrum projected onto it, he found that birds would not eat the grains in the region of the blue or violet lights, but they did eat the grains from the red end of the spectrum up to the border between the green and blue

light (Sturkie, 1976). It would seem from Hess's work that chickens may be blind to violet and blue light, or at least do not readily respond to that end of the spectrum.

However, another study conducted by J.F. Hurnik "designed to investigate whether a response in feed consumption could be achieved by the use of colored feed and feeders" (Hurnik et al, 1971) found results contradictory to Hess's. In his experiment, Hurnik studied the relationship between feed color, feed position, and the color of the feeder itself and their effect on feed consumption. Of the three factors he found feed color caused the "greatest difference" in consumption with the following order of preference: blue-39%, green-28%, yellow-23%, and red-18% (Hurnik et al, 1971).

In an experiment investigating the differences of color preferences in chicks, a marked difference was found in the preference of red color over blue (Taylor, 1969). Chicks were placed in a tank with alternatingly heated red and blue compartments. A marked difference was found in the preference for the red colored compartments over the blue.

Herbert and Sluckin (1969) studied the effect of temperatures on the color preferences of chicks in a similar experiment. The chicks were placed in an enclosed tank which was divided into opposite red and blue areas. The chicks positions were recorded as variations in the temperature of the tank were made. They found that "a clear preference for red over blue" was made throughout the experiment.

The following experiment was conducted to determine if feed consumption of broilers could be manipulated by the use of colored feed.

Materials and Methods

Two trials were conducted. For the first trial dye was used to color the feed. For the second trial colored light filters were used to illuminate the feed troughs.

Trial 1

In trial 1 standard starter feed was used in the experiment. Red, yellow, and green feed were made using a ratio of 4000 mL of water per 116 mL of French's food coloring for a total of 50 Kg of feed. The feed was then dried in a Robin's hatcher at 36.9 degrees Celsius for 98 hours. The feed was then stored in a freezer at -10 degrees Celsius to prevent mold growth.

The experiment involved one trial group of 9 pens of 20 newly hatched Arbor Acres broiler chicks. The birds were placed in pens containing two manual waterers, a brooder, and three trays each containing a different colored feed. Every day the feed trays were filled and systematically rotated within the pens. Over a period of two weeks the feed was weighed to monitor the consumption of each color.

The data were compiled and analyzed for deviance using the Statistical Analysis System.

Trial 2

For the second trial, seventy-five day old Arbor Acres broiler chicks were reared over a three week period. The chicks were divided into groups of twenty-five and placed in three separate levels of a brooder. On each level the internal dividers were removed so that the chicks had access to the entire area. Each level had four feeders and two water troughs.

Fluorescent lights were placed over each feeder with red, blue, green, and white color filters. The positions of the lights were staggered on each level so that no two lights were in the same position. Black visquine was used to cover the feed troughs so that each light source was isolated.

Feed and water were provided ad libitum. Each week, for 3 weeks, the consumption of each feed was recorded by weighing the amount of feeds in the troughs.

The data were compiled and analyzed for deviance using the Statistical Analysis System.

Results

Trial 1

The data for feed consumption for weeks 1 and 2 showed no significant differences in consumption (Figure 1). Weekly totals showed that numerically more yellow feed was consumed than the other colors. However, there were no significant differences in total consumption among the colors (Figure 2).

Trial 2

In trial 2, there were significant differences in feed consumption among the colors during the first week (Figure 3). During the first week chicks consumed significantly more of the feed illuminated with the white light than the other feeds. There were no significant differences among the other colors during weeks 2 and 3. Also there were no significant differences in feed consumption among the colors tested. However, at the end of the trial, overall consumption of the feed illuminated with the white light was significantly greater than the feeds illuminated with the red and green lights (Figure 4).

Discussion

The trial 1 data seem to imply that feed color does not effect feed preference. No significant deviations in feed consumption ocurred.

The intensity of the white light in trial 2 may have produced the significant results which were obtained. The red, blue, and green light filters may have diminished the lighting significantly more than the white light. In future studies, a measurement of the intensities of each light ensuring that lighting is uniform over each feed trough might produce favorable results.

The results found in trial 1 would seem to contradict the

results found by Hurnik (1971). Implementing the use of colored feed and feeders he found a preference for the blue colored feed followed by the green, yellow, and red colored feeds. The results from trial 1 indicated no significant deviance in feed consumption.

Trial 2 results would appear to indicate that birds respond more readily to white light than any other color.

The results obtained from both of the trials do not substantiate the possibility of using colored stimuli as a means to control the feeding behavior of birds. It is possible that birds may react more readily to certain colors within the electromagenetic spectrum, however, the use of color to enhance feed efficiency is apparently unlikely.

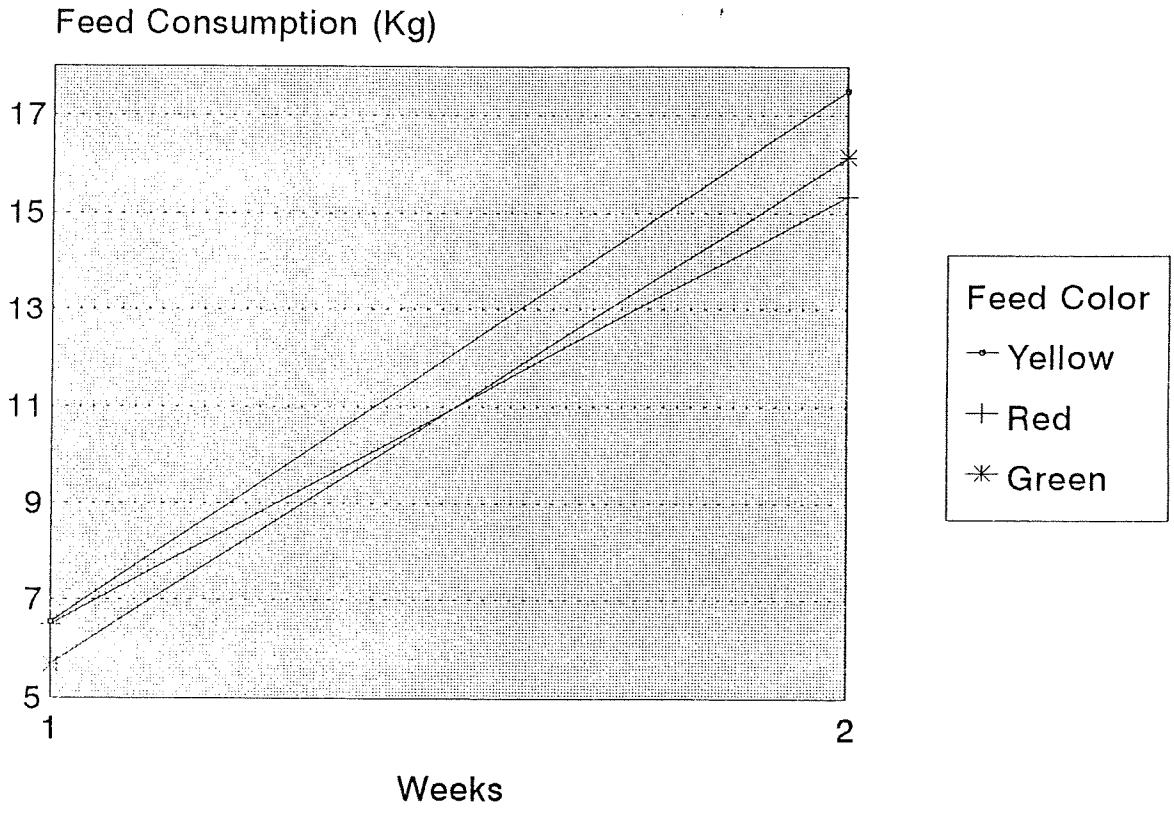

Figure 1: The amount of colored feed consumed by broilers (Trial 1)

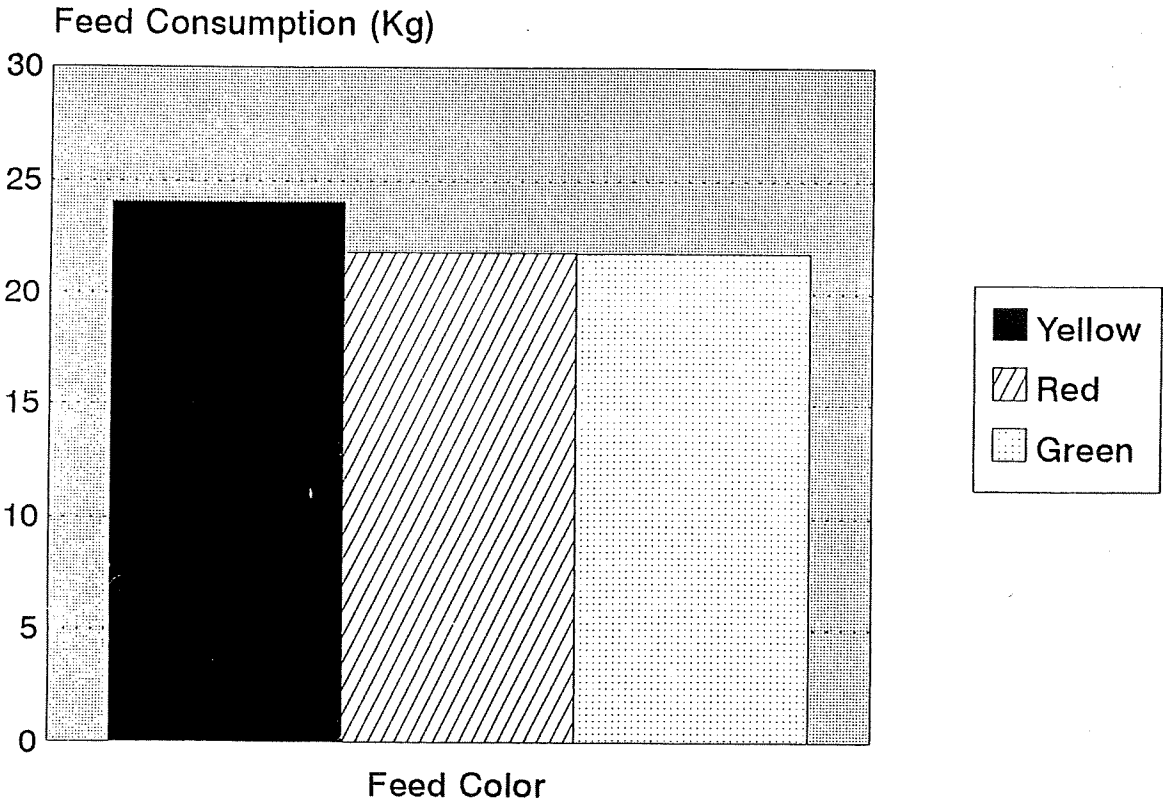

Figure 2: The total amount of colored feed consumed by broilers (Trial 1)

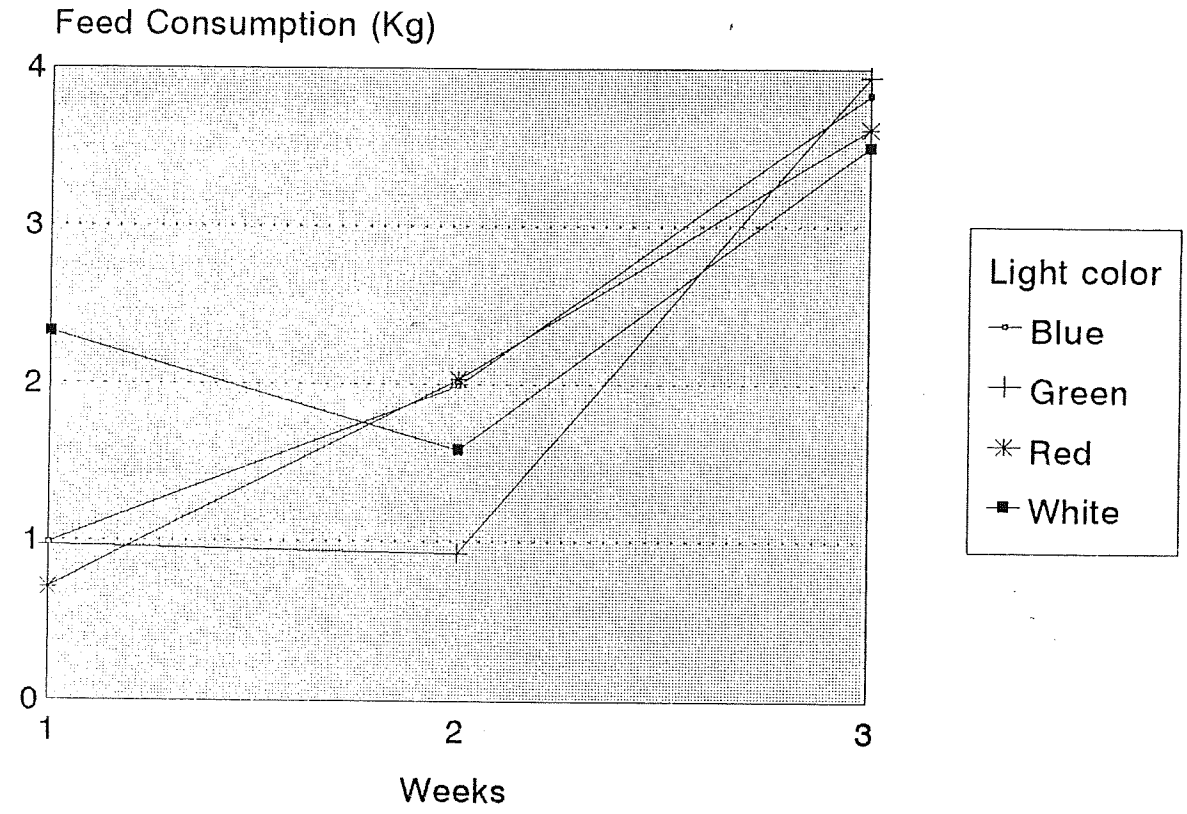

Figure 3: The amount of illuminated feed consumed by broilers (Trial 2)

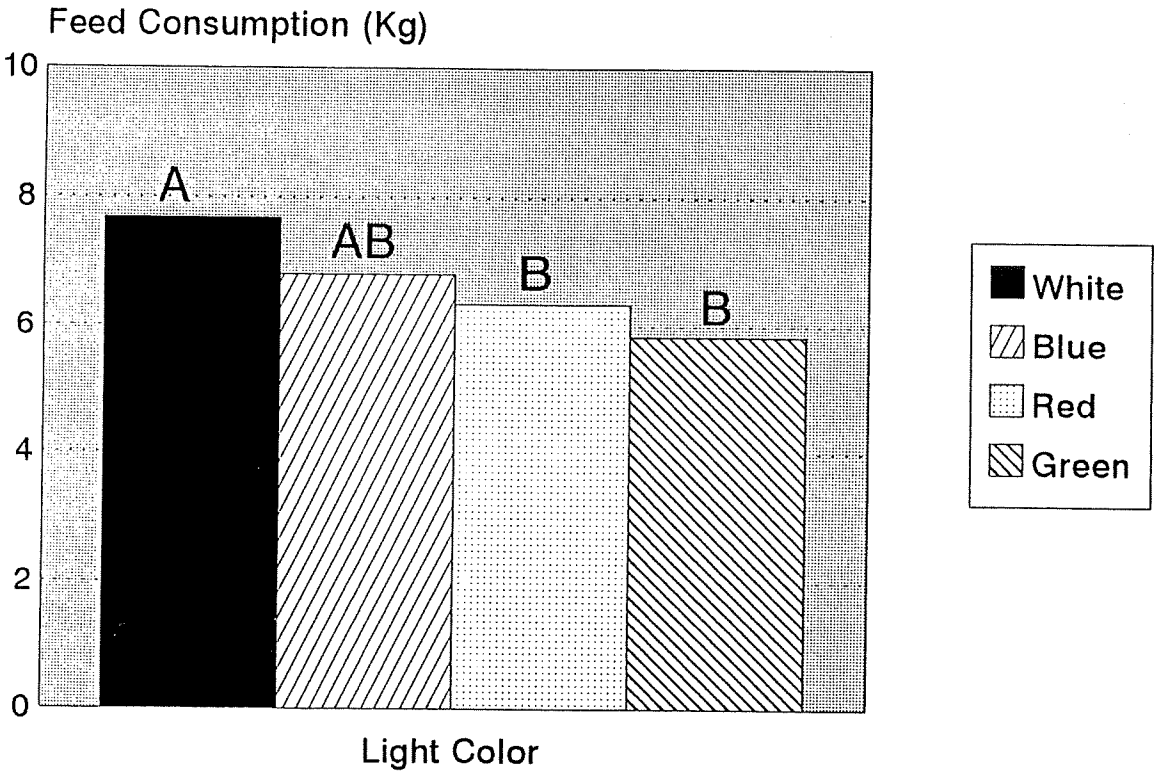

Figure 4: The total amount of illuminated feed consumed by broilers (Trial 2)
A,B means with different letters are significantly different ($p<.05$)

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