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A comparison between Formaldehyde Prills and Stalosan F powder in breeder layer nest boxes

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Abstract

1. This commercial trial was run over a period of 11 weeks commencing 02 April 2008.
2. There was no negative control – simply a comparison between current practice of using formaldehyde prills and Stalosan F powder.
3. Stalosan F powder was added weekly (25 g/week) to nest boxes whilst formaldehyde prills were added fortnightly (20 g).
4. Both the standard formaldehyde prill and Stalosan F treatments were fumigated as per standard Bromley Park Hatchery procedures and 30 eggs from each treatment were sent per week for egg membrane (EMB) testing to PVS laboratories.
5. There was no difference between either method for percentage contamination of EMB tests suggesting that Stalosan F is a suitable alternative to formaldehyde prills as a nest additive.
6. Stalosan F powder is easy to use, non hazardous and subjective assessment indicates that it reduces shed odours and dries floor litter.
7. Cost of Stalosan F per nest box per week was NZ $ 0.095 and formaldehyde prills was NZ $ 0.021. Stalosan F is therefore 4.52 times more costly than formaldehyde prills as a nest additive. However, the cost of protective clothing including gloves and gas masks needs to be added to the formaldehyde prill cost since simple dust masks are adequate for Stalosan F application. Replacement price of formaldehyde prills suggests that Stalosan may only be 1.7 times more costly than formaldehyde prills.
8. Health and safety considerations where formaldehyde use is concerned are an important issue and alternatives should be considered. The use of suitable alternatives could help towards a reduction in Accident Compensation Corporation (ACC) insurance premiums.

INTRODUCTION

The use of formaldehyde prills in nest boxes on broiler breeder farms is well documented and accepted globally as the product of choice for improving nest hygiene and thereby reducing the risks associated with poor egg hygiene. The improved egg hygiene produces a lower number of "bangers" in the hatchery setters and less subsequent yolk sac infections in the day-old broiler and commercial layer.

Whilst formaldehyde prills are accepted for use in nest boxes, the product is also acknowledged as a category 1 carcinogen for humans as well as a lung, eye and skin irritant. In addition, the New Zealand Occupational and Health legislation recognises formaldehyde gas as a causative agent for Occupational Asthma. Therefore, where risks to using formaldehyde can be eliminated then this should be considered. The only "safe" levels of formaldehyde gas are at zero ppm in inhaled air and whilst this cannot always be achieved, the principles of identifying a risk and either eliminating or minimizing the risk must occur. The purpose of this trial was to investigate an alternative to formaldehyde prills and thereby attempt to eliminate the risks for on-farm egg collectors within the Bromley Park Hatcheries group.

A recent report suggests that availability of formaldehyde prills has become a problem and delays of up to six months can be expected once orders are placed. In addition, the price of formaldehyde prills is expected to rise sharply thereby reducing the difference in cost between using Stalosan F or formaldehyde prills.

MATERIALS AND METHODS

Experimental design

This "on farm" commercial trial was carried out in Sheds "S1 and S2" at the Bromley Park Waitakere Breeder Farm over 11 consecutive weeks using Cobb 500 broiler breeder parent stock. The birds were 36 weeks of age at commencement of the trial on Wednesday, 4th April 2008. A summary of materials and methods follows:

No. of treatments: 2

No. of "pens": Each Nest box was regarded as a "pen" as follows:

- 714 nest boxes (i.e. full shed) was allocated to each treatment
- 30 eggs were selected at random from each treatment at weekly intervals for a total of 11 weeks.
- Total of 60 eggs sampled per week

No. of replicates per treatment: 30 (eggs) per week

The treatments are summarised in Table 1.

Table 1. *Summary of treatments in a 1 X 2 X 30 factorial trial (single bird type, 2 treatments and 30 repeats) per week.*

Treatment
1. Stalosan F at 25 grammes every 7 days/ nest box
2. Standard 20 grammes of formaldehyde prills every 14 days/ nest box

Treatment design

This was a commercial trial simply comparing an alternative product to current practice. At the commencement of the trial, Stalosan was added to 714 nest boxes at a rate of 25 grammes per nest box and formaldehyde prills was added to a second set of 714 nest boxes at a rate of 20 grammes per nest box. For the 11 week trial duration, **196.4 kg's of Stalosan F** was required and **78.5 kg's of formaldehyde prills**. Bill Finney allocated flock S1 to formaldehyde prills and flock S2 to Stalosan F.

At day 7 after application of the formaldehyde prills and Stalosan F, 30 eggs were collected from each shed and submitted to PVS laboratories for EMB tests. The number of eggs contaminated with colony forming units (CFU) were identified per 30 eggs and calculated as a percentage contamination. Once the eggs had been collected, Stalosan F was added to the nest boxes allocated to this treatment. At day 14, the egg collection was repeated (i.e. 30 eggs/treatment) and once complete, Stalosan F and formaldehyde prills was be added to the relevant sheds. Therefore, formaldehyde prills were added fortnightly and Stalosan F weekly. The trial was originally planned to continue for a period of 20 weeks unless a conclusive result was obtained prior to this. Once 11 weeks of data had been collected, the trial was terminated since sufficient data was available to draw firm conclusions.

Measurements

A subjective assessment of the ease of use of Stalosan compared to formaldehyde prills was carried out by the farm staff and farm manager. Egg membrane tests were carried out by PVS laboratories every 7 days to determine the percent of eggs contaminated.
Length of trial was 77 days.

Statistical Analysis

All statistical analyses were run using the statistical package of Minitab® Release 12.1 for Microsoft Windows. A one-way unstacked analysis of variance (ANOVA) was carried out for percent contamination for all treatments. Regression analyses were also carried out in an effort to determine correlations between treatments and changes over time.

RESULTS

Percentage of eggs contaminated

The ANOVA revealed that there were no statistically significant differences between the average percentage contamination of eggs per week (P = 0.69) between either the formaldehyde prills or the Stalosan F treatments. Averages per week are shown in Table 2 and graphically in Figure 1.

Table 2. *Average weekly % of eggs contaminated out of 30 sampled per treatment.*

	% eggs out of 30 contaminated	
Date	Stalosan F	Formaldehyde Prills
02/04/08	13.3	3.33
16/04/08	23.3	10.0
22/04/08	13.3	3.33
30/04/08	3.33	6.67
07/05/08	3.33	10.0
14/05/08	10.0	10.0
21/05/08	3.33	13.3
28/05/08	10.0	10.0
04/06/08	6.67	6.67
11/06/08	6.67	6.67
18/06/08	0	3.33
Average	8.48	7.58

There was no correlation between the data set for prills and Stalosan F. The previous short term trial indicated a decrease in EMB over time for both formaldehyde prills and Stalosan F but this trial showed a relatively stable result with the use of formaldehyde prills and a steady decline in CFU percentage using Stalosan F. The pattern of decreasing CFU percentage with the use of Stalosan F is consistent with the short term trial run in November 2007 and is also consistent with the manufacturer's claims that bacterial load reduces over time with the use of Stalosan F.

The negative slope of the regression line fitted to the Stalosan treatment suggests that average contamination declines by 1.273 percentage points per week of use (Figure 1.). Again, this is consistent with previous results.

Subjective assessment of Stalosan F suggests it keeps nests dry and reduces ammonia odour in the shed.

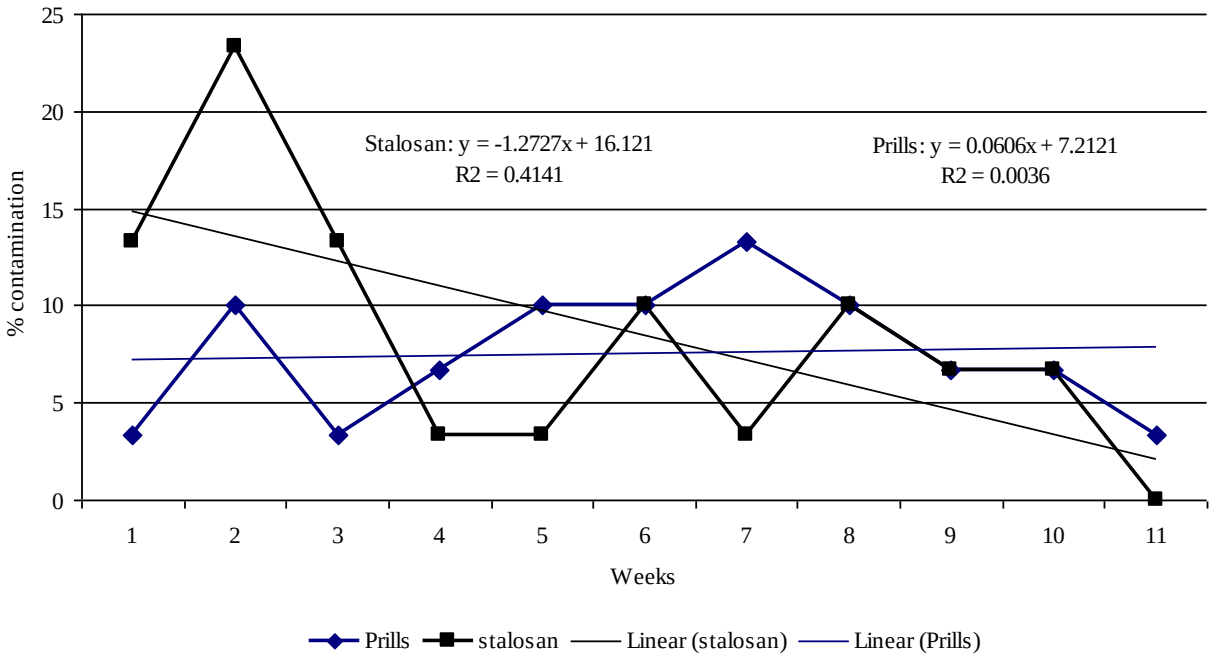

Figure 1. *Average % of eggs contaminated per week of trial.*

When probability plots (95 % confidence limits) are drawn, the degree of overlap between Stalosan F and formaldehyde prills is substantial and this explains the high P value in the ANOVA (Figure 2.).

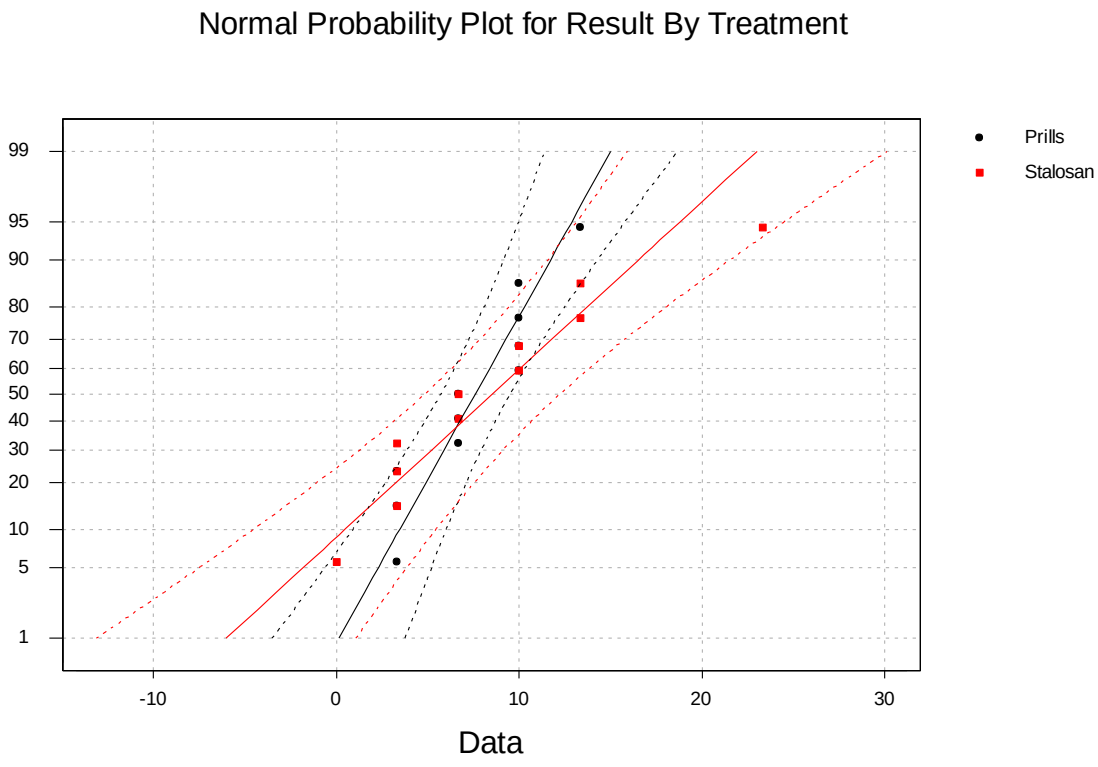

Figure 2. *Normal probability plot at the 95 % confidence limits.*

The weekly % contamination revealed by EMB tests continues to be very variable and the coefficient of variation for formaldehyde prills and Stalosan F was 44.3 % and 78.4 % respectively. This is rather disappointing and suggests inconsistencies exist in egg collection and/or egg handling prior to actual EMB testing.

Economics

Since Stalosan F is added weekly to nests as opposed to Formaldehyde Prills added fortnightly, the projected volumes of Stalosan F are significantly higher than Formaldehyde Prills. The cost of Stalosan F at time of the trial was NZ $3.80 /kg and the stock price of Formaldehyde Prills was NZ $2.10 /kg. Indications are that the price of formaldehyde prills will increase significantly and Farmchem estimate replacement stock at $5.74/kg. The trial was run with 25 grammes of Stalosan F added per nest box per week to the standard practice of 20 grammes of Formaldehyde Prills every 14 days (10 grammes per week). Therefore cost per nest box per week is NZ $0.095 and NZ $0.021 ($0.057 @ $5.74/kg) for Stalosan F and Formaldehyde Prills respectively.

Stalosan F used at the levels in this trial are therefore 4.5 times more costly than using Formaldehyde Prills although this reduces to 1.7 times more costly using the formaldehyde prill replacement cost from Farmchem.

Use of Stalosan F requires only a simple dust mask during application compared to a full gas mask and gloves for Formaldehyde Prills and it is noted that whilst the cost of protective clothing should be accounted for in the economic assessment of the comparison, to arrive at true cost values, this was beyond the scope of this initial trial.

DISCUSSION

Some of the variables that contribute to on-farm variability include operator (i.e. egg collector) differences, time of day eggs are collected, speed of egg collection and egg handling practices and this results in variable EMB tests. However, it is encouraging this trial showed no significant differences between Stalosan F and formaldehyde prills suggesting the Stalosan is a suitable substitute for formaldehyde prills.

When the shed at the farm was placed on trial, it was assumed that the standard practice of Formaldehyde Prills was already in place. However, the actual use of prills and the theoretical use differ across the company and approximately half of the prills are being used compared to what should be used. There is an obvious and not unexpected reluctance to using prills and a suitable alternative that is safe to use should not have the same problem. The reluctance to use Formaldehyde Prills provides some uncertainty as to the nest box hygiene status at trial commencement. The Stalosan F is easy to apply and subjective comments are that it is more likely to be added than Formaldehyde Prills. It is possible that less than 25 grammes of the Stalosan can be added per week and it is suggested a long term trial using 10 grammes per week would be worthwhile doing.

Shavings are also replaced regularly in the nest boxes and the hygiene status of new shavings is unknown and usually variable.

Stalosan F has a pleasant smell and is non-irritating to skin. It is also harmless to poultry, so birds ingesting the product are not adversely affected. Prills are not used in the Shaver parent stock at Bromley Park since these birds ingest the product. Stalosan F is a powder and would be difficult for birds to ingest easily, or in any significant amounts, so a long term trial on Shavers may be appropriate.

ACKNOWLEDGEMENTS

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