Safe-Guard® turkeys
(fenbendazole)

Evaluation of Safe-Guard® (fenbendazole) Efficacy in Turkeys Under Simulated Field Conditions and *Ascaridia Dissimilis* Challenge.

Abstract: In order to measure the effect of *Ascaridia dissimilis* on tom turkeys and the control of this worm obtained with treatments of recently FDA approved Safe-Guard (fenbendazole) dewormer, a trial was established at the University of Arkansas. Twenty one pens of 35 tom turkeys received either 1 Safe-Guard treatment on days 63-69, 2 Safe-Guard treatments on days 63-69 and 91-97 or no treatment. Birds were exposed to standarized infection challenge on a daily basis from days 35 to 112; this to simulate field conditions. Birds were weighed on days 7, 35, 63, 91 and 119. Feed consumption was monitored throughout the study. Birds were posted for worm burden determinations on days 63, 69, 91 and 97. The trial indicated that *Ascaridia dissimilis* reduced weight by 0.22 lbs at 9 weeks, 0.74 lbs at 13 weeks and 0.96 lbs at 17 weeks. Feed efficiency in infected toms was decreased by 7 to 40 points depending on feeding period. A single Safe-Guard treatment at weeks 9 improved gain by 0.49 lbs and feed efficiency by 4 points. Two treatments at week 9 and 13 resulted in 0.74 lb increased gain and 9 point improvement in feed efficiency. One Safe-Guard treatment returned $0.29 more profit per tom and 2 treatments returned $0.51 per tom compared to infected controls.

Introduction: The turkey “roundworm”, *Ascaridia dissimilis*, has been viewed as a marginal economic problem by the turkey production industry. Many producers do not feel that this infection requires treatment and can not justify the expense. Others view this infection as treatable, but utilize ineffective treatments. A third group of producers consider this infection as economically significant and treat with prescription medication.

Safe-Guard (fenbendazole) was given FDA approval in turkeys for the removal and control of roundworm adults and larvae (*Ascaridia dissimilis*) and cecal worm adults and larvae(*Heterakis gallinarium*); the latter being an important vector of *Histomonas meleagridis* (blackhead). To establish efficacy and economic values of Safe-Guard treatments under simulated field conditions, a trial was conducted by Drs. Yazwinski and Tucker at the University of Arkansas.

Objectives:

1. To evaluate Safe-Guard's effectiveness when delivered to naturally infected turkeys at the rate of 16 ppm (14.5 g/t) for 6 days.
2. To determine feed efficiencies and weight gains as influenced by *A. dissimilis* and varying degrees of anthelmintic intervention.
3. To establish proper treatment scheduling for the control of Ascaridia in the field.
4. To achieve the above objects while using *A. dissimilis* infections that were representative of the industry in respect to source, epidemiology and magnitude.

Methods and Materials:

Trial Design

		Safe-Guard Treatment	
Isolate Origin	**Pens**	**Days 63-69**	**Days 91-97**
Neg. Control	3	–	–
NC/VA	2	–	–
CA	2	–	–
AR/MO	2	–	–
NC/VA	2	Yes	No
CA	2	Yes	No
AR/MO	2	Yes	No
NC/VA	2	Yes	Yes
CA	2	Yes	Yes
AR/MO	2	Yes	Yes

Procedures:

- Trial was conducted at a University of Arkansas turkey floor-pen parasite research barn.
- Twenty-one, 6ft x 12ft pens were utilized
- The test population was composed of 840 tom turkey poults obtained from a commercial hatchery.
- 40 day-old tom poults were placed into each pen on day 7, and reduced to 35 poults per pen on day 35.
- Hanging plasson waterers and canister feeders were utilized
- New dry wood shavings were used as litter.
- A basal feed was purchased from a local commercial turkey company.
- Safe-Guard was mixed into the basal feed at the University of Arkansas, Poultry Center of Excellence feed mill by Dr. H. D. Chapman.
- Starting on day 35, Ascaridia infections were introduced via feed in the infection positive pens at the rate of 100 eggs per bird per day for the duration of the trial. (Infection timing and rate were chosen to simulate natural field exposure to Ascaridia).

Data Collection Schedule:

- Individual birds were weighed on days 7, 35, 63, 91 and 119.
- Pen feed consumptions was measured through days 35, 63, 91 and 119.
- Ascaridia burdens by stage were determined on days 63, 69, 91, 97 and 119.

Results:

Table 1. Individual bird weights prior to Ascaridia infection:

Treatment Group	Ave. Weight (lbs.) on day: 7 (1 wk)	35 (5 wks.)
To receive NC/VA isolates	.33[a*]	3.78
To receive CA isolates	.31[a]	3.67
To receive AR/MO isolates	.31[a]	3.66
To receive no infection	.30[b]	3.65

*P ≤ 0.05

Table 2. Average bird weights after early infection, before Safe-Guard treatment:

Treatment Group	Ave. Weight (lbs.) on day: 63 (9 wks.)
NC/VA infection	11.58
CA infection	11.55
AR/MO infection	11.66
Ave. all infections	11.60[a*]
No infection	11.82[b]

*P ≤ 0.05

Table 3. Average bird weights after infection and first Safe-Guard treatment given days 63-69:

Treatment Group	Ave. Weight (lbs.) on day: 91 (13 wks.)
All infections, no Safe-Guard	20.20[b*]
All infections, Safe-Guard days 63-69	20.42[b]
No infection	20.94[a]

*P ≤ 0.05

Table 4. Average bird weights after infection and both Safe-Guard treatments given days 63-69 and 91-97:

Treatment Group	Ave. Weight (lbs.) on day: 119 (17 wks.)
All infections, no Safe-Guard	29.35[b*]
All infections, Safe-Guard days 63-69	29.64[ab]
All infections, Safe-Guard days 63-69 and 91-97	29.91[ab]
No infection	30.31[a]

*P<0.05

Table 5. Average feed efficency prior to infection for the 7-35 day period:

Treatment Group	Feed Eff. (lbs. feed/lbs. gain)
To receive NC/VA isolates	1.40
To receive CA isolates	1.40
To receive AR/MO isolates	1.40
To receive no infection	1.41

NOTE: Statisical analysis not preformed on feed efficiency data due to small number of pens (2) per treatment

Table 6. Average feed efficiency after early infection, before Safe-Guard treatment (for the 35-63 day period):

Treatment Group	Feed Eff. (lbs. feed/lbs. gain)
NC/VA isolates	2.02
CA isolates	1.98
AR/MO isolates	1.96
No infection	1.92

Table 7. Average feed efficiency after infection and first Safe-Guard treatment given days 63-69 (for the 63-91 day period):

Treatment Group	Feed Eff. (lbs. feed/lbs. gain)
All infections, no Safe-Guard	3.08
All infections, Safe-Guard days 63-69	2.96
No infection	2.83

Table 8. Average feed efficiency after infection and both Safe-Guard treatments given days 63-69 and 91-97 (for the 91-119 day period):

Treatment Group	Feed Eff. (lbs. feed/lbs. gain)
All infections, no Safe-Guard	4.34
All infections, Safe-Guard days 63-69	4.32
All infections, Safe-Guard days 63-69 and 91-97	4.11
No infection	3.94

Table 9. Average performance during the entire study (1-17 wks.):

Treatment Group	Gain lbs.	ADG. lbs.	Feed Cons. (lbs.)	Feed Eff. (lbs./lbs.)
All infections, no Safe-Guard	28.42	.254	84.24	2.97
All infections, Safe-Guard days 63-69	28.91	.258	84.71	2.93
All infections, Safe-Guard days 63-69 and 91-97	29.16	.260	83.91	2.88
No infection	29.58	.264	81.64	2.76

Table 10. Average *Ascaridia dissimilis* burdens on day 63 (before Safe-Guard treatment):

		Infection Isolate			
Stage	**Uninfected**	**NC/VA**	**CA**	**AR/MO**	**Average**
L2	0	100.8	73.9	97.7	90.8
L3	0	299.6[a]*	92.5[b]	229.2[a]	207.1
L4	0	10.7	4.0	2.6	5.8
Early Adult	0	2.4	4.7	4.4	3.8
Gravid Female	0	0	0	0	0
Total	0	442.5[a]	199.0[b]	355.1[a]	332.2

*P≤0.05 for means on the same line

Table 11. Average *Ascaridia dissimilis* burdens on day 69 (immediately after first Safe-Guard treatment):

		All Isolates Combined		
Stage	**Uninfected**	**Safe-Guard days 63-69**	**Infected, no treatment**	**Percent Efficacy**
L2	0	2.0[b*]	102.2[c]	98.1
L3	0	2.1[b]	124.7[c]	98.3
L4	0	0[a]	7.5[b]	100.0
Early Adult	0	0[a]	0.8[b]	100.0
Gravid Female	0	0[a]	1.0[b]	100.0
Total	0	3.0[b]	256.0[c]	98.8

*P≤0.05 for means on the same line

Table 12. Average *Ascaridia dissimilis* burdens on day 91 (just before second Safe-Guard):

		All Isolates Combined	
Stage	**Uninfected**	**Safe-Guard days 63-69**	**Infected, no tratment**
L2	0[a*]	25.7[b]	30.6[b]
L3	0.3[a]	54.7[b]	56.2[b]
L4	0[a]	3.7[b]	4.5[b]
Early Adult	0[a]	0.8[a]	8.6[b]
Gravid Female	0[a]	0.0[a]	1.9[b]
Total	(<0.1)[a]	92.6[b]	117.2[b]

*P≤0.05 for means on the same line

Table 13. Average *Ascaridia dissimilis* burdens on day 97 (immediately after the second Safe-Guard treatment):

	All Isolates Combined				
Stage	**Uninfected**	**Safe-Guard days 63-69**	**Safe-Guard days 63-69 & 91-97**	**Infected, no treatment**	**Percent Efficacy ****
L2	0[a]	27.5[b]	0.4[a]	55.1[c]	98.4
L3	1.3[a]	44.3[b]	1.2[a]	74.2[c]	97.8
L4	0.3[b]	2.9[c]	<0.1[b]	2.1[c]	100
Early Adult	0.1[b]	1.7[c]	0[b]	2.4[c]	100
Gravid Female	0[b]	0.1[b]	0[b]	0.7[c]	NA
Total	1.7[b]	87.6[c]	1.6[b]	141.3[c]	98.2

*P≤0.05 for means on the same line

** Efficacy improvement from 3 weeks after 1st deworming to post final deworming.

Table 14. Economic analysis of the performance data for the entire trial:

Item	**Uninfected**	**Infected, no treatment**	**Safe-Guard days 63-69**	**Safe-Guard days 63-69 & days 91-97**
Gain, lbs.	29.58	28.42	28.91	29.16
Feed/gain, lbs./lbs.	2.76	2.97	2.93	2.88
Expenses				
Feed/bird, lbs.	81.64	84.40	84.71	83.98
Feed cost/bird, $[1]	6.53	6.75	6.78	6.72
Drug cost/bird, $[2]	0	0	0.026	0.041
Feed & drug cost/bird, $	6.53	6.75	6.81	6.76
Revenue				
Gain, lbs.	29.58	28.42	28.91	29.16
Value, $[3]	20.71	19.89	20.24	20.41
Return over feed & drug, cost/bird, $	14.18	13.14	13.43	13.65
Safe-Guard advantage/bird, $[4]	–	–	0.29	0.51

[1] Feed cost @ $160/ton

[2] Safe-Guard cost @ $13.00/ton

[3] Toms @ $0.70/lb. live weight

[4] Compared to infected controls

Discussions:

In this trial,low to moderate *A. dissimilis* infections resulted in the reduced average weights of tom turkeys by 0.22 lbs at 9 weeks, 0.74 lbs at 13 weeks and 0.96 lbs at 17 weeks when infected, untreated birds were compared to non-infected controls. Feed efficiency measured in this trial was also decreased due to worm infection by 7 to 40 points depending on the period measured.

Compared to infected controls, deworming with Safe-Guard for 6 days during week 9 improved gain by 0.49 lbs and feed efficiency by 4 points. Safe-Guard treatment at week 9 and again at week 13 resulted in an average 0.74 lb increased gain and a 9 point improvement in feed efficiency. Trial data indicate that a single Safe-Guard treatment during week 9 returned $0.29 more profit per tom while two Safe-Guard treatments (week 9 and again at week 13) returned $0.51 more profit per tom compared to infected controls.

Conclusion:

Low to moderate infections by *A. dissimilis* significantly reduced turkey performance and thus the economic returns for commercial producers. Toms receiving Safe-Guard treatments showed improved weight gain and feed efficiency when compared to infected control populations. FDA approved Safe-Guard dewormer was proven to be a highly effective (greater than 98% overall efficacy) and economically advantagious treatment for the control of *Ascaridia dissimilis* infections in tom turkeys.

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