RUMENSIN® RESEARCH BRIEF 1

Evaluation of feeding 48 ppm of Rumensin® on feed efficiency and resulting performance of steers fed to harvest — an 11-trial summary[1]

STUDY OVERVIEW

A meta-analysis of 11 trials was conducted to determine the effect of feeding different levels (36 ppm vs. 48 ppm) of Rumensin to more than 10,000 head of fed cattle.

KEY STUDY RESULTS

Results of the meta-analysis indicate that when fed at 48 ppm, Rumensin significantly ($P < 0.01$) improves feed conversion, numerically ($P = 0.37$) reduces DM intake and numerically ($P = 0.14$) increases average daily gain.

BACKGROUND INFORMATION

TRIAL DESIGN

- A total of 11 "large-pen" efficacy studies conducted
- Research locations: Texas (5), Oklahoma (4), Colorado (1) and Nebraska (1)
- Each study included two common treatments
  - Rumensin (36 ppm) plus Tylan® in the final diet
  - Rumensin (48 ppm) plus Tylan in the final diet
- Cattle type
  - Nine studies used English and/or Continental crossbred steers (9,229 hd with an initial weight of 714 lbs)
  - Two studies used calf-fed Holsteins (1,790 hd with an initial weight of 277 lbs)
- Total hd — 11,019 with an initial weight of 634 lbs
- Statistical model
  - STATA software
  - All variables tested for heterogeneity
  - If heterogeneity existed ($P < 0.05$), a random effects model was used
  - If heterogeneity did not exist ($P > 0.05$), a fixed effects model was used
  - Forest and influence plots developed

Table 1. 11-trial summary animal accountability

	Rumensin level	
	36 ppm	48 ppm
No. started	5,523	5,496
No. dead	71[a]	66[b]
No. removed	112	111
No. harvested	5,343	5,321

[a]Death loss due to digestive (37), respiratory (18) and other causes (16).
[b]Death loss due to digestive (16), respiratory (26) and other causes (24).

For improved feed efficiency in beef cattle (steers and heifers) fed in confinement for slaughter. Feed continuously at a rate of not less than 33 g and not more than 48 g monensin activity per tonne (1,000 kg) until animals reach market weight.

The data used to support a claim for feed efficiency for a dose range of 33 to 48 ppm was derived from a meta-analysis, including 11 studies and more than 11,000 animals. This analysis demonstrated an additional improvement in feed efficiency of 0.05 units on a "deads out" basis in cattle fed 48 ppm when compared with those fed 33 ppm. In some herds, no additional improvement in feed efficiency was shown from feeding Rumensin Premix at levels greater than 33 ppm.

Decisions on the appropriate dose of Rumensin Premix should be made in consultation with your veterinarian.

[1]Data on file. Elanco Animal Health.

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BACKGROUND INFORMATION

The meta-analysis of 11 trials included a mix of cattle breed types and different roughage

Table 3. Description of breed types, ration percent concentrate, number of ration step-ups and total days on feed

Study Number	Study type	**Description of diet** All diets contained 88% to 94% concentrate	Replications	Number of hd Rumensin	
				36 ppm	48 ppm
T1F080701	Distillers grain study	Steam-flaked corn diet with 25% wet distillers grains DM basis	4	280	280
T1F200706	Distillers grain study	Steam-flaked corn diet with 25% wet distillers grains DM basis	4	286	286
T1F310702	Distillers grain study	High-moisture corn/dry-rolled corn diet with 25% wet distillers grains DM basis	8	160	160
T1F400705	Roughage level study	Steam-flaked corn diet with either alfalfa hay or corn silage as the roughage source (6% or 9% DM)	4	652	651
T1F480614	Roughage level study	Steam-flaked corn diet with either alfalfa hay or corn silage as the roughage source (6% or 9% DM)	4	755	738
T1F489101	Calf-fed Holstein study	High-moisture corn/steam-flaked milo/ whole-corn combination with alfalfa hay	6	503	514
T1F489414	Calf-fed Holstein study	High-moisture corn/steam-flaked corn/ dryrolled corn combination with alfalfa hay	6	380	393
T1FUS090016	Rumensin 36 ppm vs. 48 ppm	Steam-flaked corn diets with either alfalfa hay and/or corn silage as the roughage source	6	636	636
T1FUS110003	Rumensin 36 ppm vs. 48 ppm	Steam-flaked corn diets with either alfalfa hay and/or corn silage as the roughage source	10	817	817
T1FUS090011	Rumensin 36 ppm vs. 48 ppm	Steam-flaked corn diets with either alfalfa hay and/or corn silage as the roughage source	6	484	483
T1FUS090010	Rumensin 36 ppm vs. 48 ppm	Steam-flaked corn diets with either alfalfa hay and/or corn silage as the roughage source	6	570	538
		TOTAL	**64**	**5,523**	**5,496**

Table 2. Description of diet, replications and head count

Study Number	Breed type	Initial body weight, lbs	Final ration % concentrate	Replications	Number of hd Rumensin	
					36 ppm	48 ppm
T1F080701	Crossbred steers	678	88.0	5	20-22	190
T1F200706	Crossbred steers	739	95.0	3	14	181-182
T1F310702	Crossbred steers	725	90.5	5	21	152-156
T1F400705	Crossbred steers	784	91.0 or 94.0	4	21	150-159
T1F480614	Crossbred steers	663	91.0 or 94.0	4	20	177
T1F489101	Calf-fed Holsteins	285	92.0	4	26	370
T1F489414	Calf-fed Holsteins	269	91.5	3	17	370
T1FUS090016	Crossbred steers	787	88.0	4	22	151
T1FUS110003	Crossbred steers	641	95.0	4	30	209
T1FUS090011	Crossbred steers	676	95.0	3	25	181-182
T1FUS090010	Crossbred steers	731	91.0	2	22	183-198

STUDY RESULTS

Results of the meta-analysis indicate that when fed at 48 ppm, Rumensin significantly ($P < 0.01$) improves feed conversion, numerically ($P = 0.37$) reduces DM intake and numerically ($P = 0.14$) increases average daily gain. The economics of an improvement in feed efficiency needs to be assessed using current ration costs.

Study	Forest plot of "deads and removals out" feed conversion			Forest plot of "deads and removals in" feed conversion		
		Weighted mean diff. (95% CI)	**% Weight**		**Weighted mean diff.** (95% CI)	**% Weight**
Distillers study T1F080701		-0.14 (-0.27, -0.01)	3.4		-0.12 (-0.33, 0.09)	3.0
Distillers study T1F200706		-0.03 (-0.30, 0.24)	0.8		0.02 (-0.26, 0.30)	1.6
Distillers study T1F310702		-0.07 (-0.27, 0.13)	1.5		-0.07 (-0.27, 0.13)	3.2
Roughage study T1F400705		-0.03 (-0.21, 0.15)	1.8		-0.02 (-0.22, 0.18)	3.3
Roughage study T1F480614		-0.04 (-0.08, -0.00)	38.3		-0.01 (-0.13, 0.11)	9.5
Calf-fed Holstein study T1F489101		-0.05 (-0.16, 0.06)	5.4		-0.13 (-0.21, -0.05)	20.5
Calf-fed Holstein study T1F489414		-0.06 (-0.13, 0.01)	11.3		-0.11 (-0.23, 0.01)	9.6
Rumensin 36 vs. 48 T1FUS090016		-0.23 (-0.39, -0.07)	2.5		-0.13 (-0.31, 0.05)	4.1
Rumensin 36 vs. 48 T1FUS110003		-0.07 (-0.12, -0.02)	20.4		-0.14 (-0.22, -0.06)	19.5
Rumensin 36 vs. 48 T1FUS090011		-0.02 (-0.19, 0.15)	2.1		0.03 (-0.16, 0.22)	3.4
Rumensin 36 vs. 48 T1FUS090010		-0.01 (-0.08, 0.06)	12.4		0.01 (-0.07, 0.09)	22.3
Overall (95% CI)		**-0.05 (-0.08, -0.03)**			**-0.07 (-0.11, -0.04)**	

Heterogeneity chi-squared (between study variation) = 9.08 (d.f. = 10) $P = 0.524$
Test of WMD = 0 : z = 4.23 : $P = 0.000$ (treatment effect)

Heterogeneity chi-squared (between study variation) = 13.10 (d.f. = 10) $P = 0.218$
Test of WMD = 0 : z = 4.03 $P = 0.000$ (treatment effect)

FOREST PLOT KEY

- Horizontal lines represent 95% CI for each study
- Vertical dashed line represents summary effect, and left and right points of the diamond denote the summary effect at 95% CI
- Box size is weight given to each study for summary estimate

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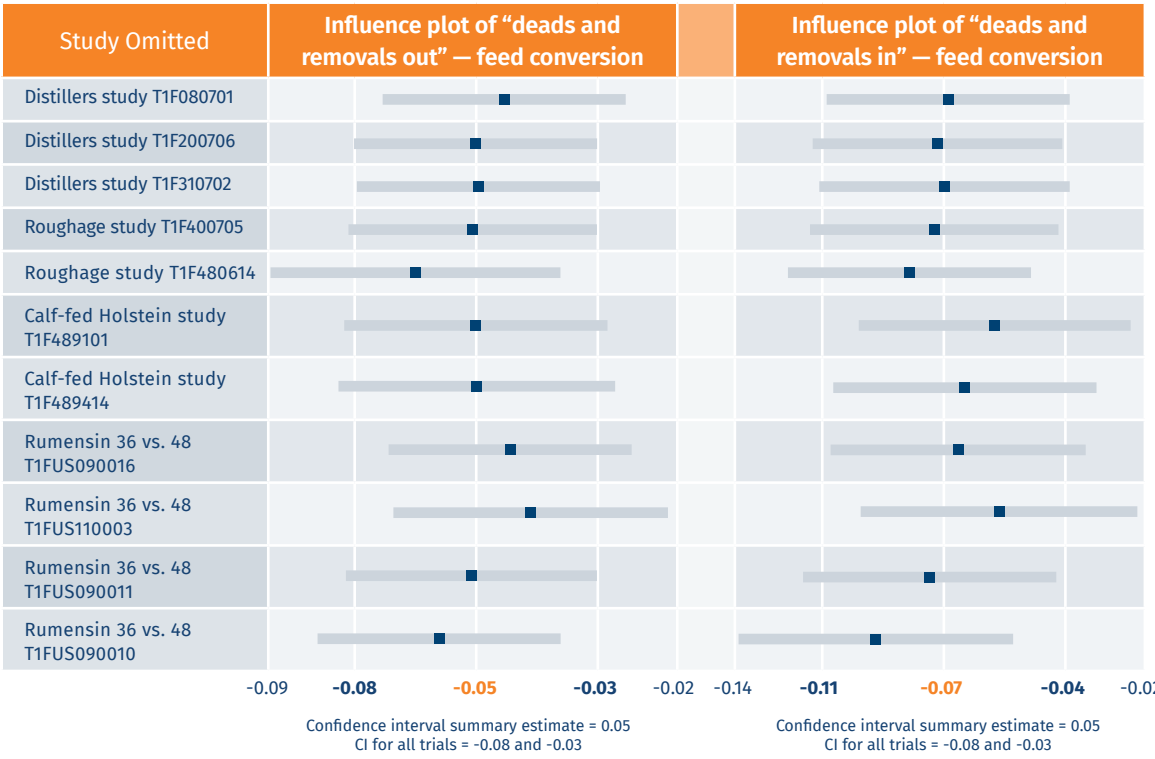
STUDY RESULTS



INFLUENCE PLOT KEY

- Horizontal lines represent 95% confidence interval (CI) when given study is omitted
- Squares represent new summary estimate when given study is omitted

KEY FINDINGS

When the data is expressed on a "deads and removals out" basis, increasing the level of Rumensin from 36 ppm to 48 ppm across all 11 studies:

– Numerically reduced DM intake (**P** = 0.37)
– Numerically increased average daily gain (*P* = 0.14)
– Improved feed conversion (*P* < 0.01) by 0.05 units

When the data is expressed on a "deads and removals in" basis, increasing the level of Rumensin from 36 ppm to 48 ppm across all 11 studies:

– Numerically reduced DM intake (*P* = 0.45)
– Numerically increased average daily gain (*P* = 0.37)
– Improved feed conversion (*P* < 0.01) by 0.07 units

Response to the 48 ppm of Rumensin was consistent across beef and calf-fed Holsteins, and consistent across different types of diets.

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