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المشروع البحثى

بعنوان

تأثير إعطاء المضادات الحيوية علي كفاءه أداء الحيوان وإنتاجية اللحم واللبن في المجترات وعلي مظاهر تلوث البيئة

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الملخص العربي

إن احتياج الإنسان للبروتين الحيواني بصفة مستمرة وذلك لبناء الجسم السليم ما زال يمثل مشكلة كبيرة بسبب الزيادة المستمرة في تعداد السكان في مصر بنسبة عالية لا تتناسب مع زيادة الإنتاج الحيواني من الألبان واللحوم التي تكفي القوي البشرية داخل الوطن .

من أجل هذا كان من الضروري الإتجاه الي طرق بحثية جديدة هدفها توفير كمية من الألبان واللحوم مع استهلاك عليقة اقتصادية بسيطة مع العمل من أجل الحصول علي أعلي انتاج بأقل تكلفة ممكنة.

إن الإتجاه الحديث في تطوير الإنتاج الحيواني المنتج للألبان واللحوم كان هدفا مهما ومؤكدا من اجل الزيادة في انتاج الألبان وذلك من خلال تطوير العلائق المختلفة وأيضا وسائل تجميع الألبان وحفظها وتصنيعها. وايضا انتاج اللحوم باقل تكلفة مع الإتجاه الي توفير علائق واضافات علائق مختلفة من اجل الحصول علي أعلي انتاجية ممكنة.

من هذا الهدف استخدم لهذه الدراسة مركب المونانسن الذي يعتبر من المركبات التي سمح باستخدامها(عالميا بواسطة المنظمة العالمية للدواء والغذاء) كاضافات للعلائق المختلفة بهدف الحصول علي معدل زيادة كبير في انتاج اللحوم والألبان. هذا بالإضافة الي كونة يعمل علي زيادة تحويل النيتروجين في الأمعاء وتغيير الكائنات الصغيرة التي تساعد علي الهضم في الكرش وبالتالي ادي الي زيادة نسبة البروتين وتقليل نسبة الفاقد من مخرجات الحيوانات. اما من ناحية تاثير المونانسن علي البيئة المحيطة فانة أدي الي تقليل انتاج غاز الميثان وايضا المركبات النيتروجينية التي تؤدي الي تلوث الماء والهواء. مما ادي الي تقليل الأضرار الناتجة عن زيادة نسبة المركبات النيتروجينية بالنسبة لصحة الإنسان والحيوان.

اتضح من هذة الدراسات السابقة علي مركب المونانسن ان اضافتة الي العلائق المختلفة يؤدي الي زيادة انتاج الألبان اليومي وزيادة معدل النمو في الأبقار وايضا معدل التشافي في ماشية انتاج اللحم. بالأضافة الي انه يساهم في تقليل نسبة الإصابة بمرض الكيتوزس الذي يحدث بعد الولادة مباشرة في الماشية الحلوب. أما بالنسبة لتاثيره علي الجهاز الهضمي في الحيوان انه يقلل التعرض للإصابة بالإنتفاخ المستمر وكذلك يقلل من احتمالات تغير وضع الكرش.

تم اجراء هذا البحث علي ابقار الهوليشتين في مزارع الأبقار الحلوب بمحافظة دمياط وقد اجريت هذة الدراسة علي عدد ٢٠ بقرة حلوب. ولقد تم تهيئة عدد ١٠ أبقار علي المونانسن لمدة اسبوعين ثم اضافة ١٠جم/ طن لعلائق الحيوانات لمدة ثلاثة اسابيع اما بالنسبة للمجموعة الضابطة التي تتكون من ١٠ ابقار تناولت عليقة عادية بدون اضافة مونانسن.

بعد ذلك تم تجميع الدم من كلتا المجموعتان المختبرة والضابطة) ثم تم فصل المصل من جميع الأنابيب التي تحتوي علي الدم المتجلط وذلك لتحديد نسبة البروتين الكلي ونسبة الألبيومين والجلوبيولين والجلوكوز و اليوريا و الكولوستيرول ونسبة البيليروبين في مصل الدم.

النتيجة

لقد خلصت هذة الدراسة الي ان اعطاء المونانسن في علائق الحيوانات ادي الي زيادة معنوية في نسبة البروتين الكلي واليوريا والجلوبيولين وكذلك نسبة الكولستيرول في مصل الدم . اما نسبة الألبيومين والجلوكوز والبيليروبين الكلي لم تكن هناك اي زيادات معنوية. ايضا توصلت هذة الدراسه الي ان اعطاء المونانسن في علائق الحيوانات ادي الي زيادة معنوية في اوزان الأبقار وكذلك اوزان اللبن اليومي .

الخلاصة

ان استخدام بعض اضافات الأعلاف مثل المونانسن ادي الي فوائد كثيرة علي مستوي الحيوان وكذلك علي المستوي البيئي . اولا علي مستوي الحيوان ادي الي زيادة معدل تحويل النيتروجين في الأمعاء وتغيير الكائنات الهاضمة في الكرش التي ينتج عنها زيادة نسبة البروتين وبذلك يقل الفاقد من العليقة في مخرجات الحيوان وفي المقابل يؤدي ذلك الي زيادة النمو وكذلك نسبة اللبن اليومي. اما علي المستوي البيئي ادي استخدامه الي تقليل انتاج غاز الميثان وكذلك المركبات النيتروجينية التي تؤدي الي تلوث الهواء والماء.

Research Project

ON

Studies the effect of some antibiotics on meat and milk in ruminants

Presented by

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Introduction

Rumensin (monensin) is the first ionophore to be approved by the Food and Drug Administration (FDA) for increased milk production efficiency (production of marketable4.0% solids-corrected milk per unit of feed intake) when fed to dairy cows.

A number of investigations have demonstrated that monensin increases milk yield when fed to cows offered mixed grain and forage diets (Mohsen et al., 1981; Kube et al., 1988; Granzin and Dryden, 1999) or pasture based diets (Lynch et al., 1990 and Hayes et al., 1996).

The dairy industry has improved the efficiency of milk production over the years. Total mixed rations and other factors had led to a more than four fold increase in milk production per cow since 1940. However, the feed required for production of that milk only increased two fold (NRC, 2001). These changes led to a doubling in the efficiency of milk production. However, milk production efficiency (MPE) as a metric, is not commonly measured like feed conversion is in other livestock enterprises. For example, in the U.S. A. about 95% of the cattle fed in feedlots rumensin in their rations (Raun, 1990).

Beckett et al. (1998) mentioned that sodium monensin, an ionophore antibiotic produced by Streptomyces cinnamonensis had many benefits such as modified the ruminal flora and improved the digestive efficiency of cattle. The effects of monensin supplementation include increased ruminal propionate production, reduced in vivo and in vitro production of methane, increased dry matter and starch digestibility, decreased production of bacterial protein in the rumen, increased nitrogen retention and significantly increased flow of amino acids to the duodenum and digestion of amino acids in the duodenum. A decreased ruminal turnover rate and increased rates of ruminal fill have been noted with treatment and monensin can modify the flux of ions across epithelial cells of the intestine and increase the uptake of calcium, selenium, and other cations. The treatment of lactating dairy cows with monensin has resulted in increased plasma glucose concentrations and decreased plasma ketone concentrations. The capacity of monensin to alter metabolism suggests that the effects of monensin treatment on reproduction, health, and production of dairy cows require further investigation .

There are a closely link between the amount of feed consumed and amount of milk production (Hutjens, 2003 and Britt et al., 2004)

1. Biochemical Effects of monensin on blood constituents

Effect of monensin administration on blood urea nitrogen level

Increased milk and blood urea concentration resulted because both parallel dietary CP content (Broderick and Clayton, 1997).

Increases in blood urea nitrogen due to monensin in dairy cows have been reported previously (Duffield et al., 1998a and Hayes et al., 1996). These studies had much larger sample sizes, which could explain why they obtained significant increases, whereas only numeric increases were observed in our study. Also Duffield et al. (1998a) suggests that this increase is due to a greater supply of bypass protein to the small intestine and a subsequent increase in the use of absorbed nonessential AA for gluconeogenesis. This would lead to a rise in deamination of these AA and higher concentration of BUN. The significant increase in apparent digestibility postcalving and the numeric increase in this digestibility precalving found in our study supports this theory.

1.2. Effect of monensin administration on plasma protein

Haimoud et al. (1995) investigated the effect of monensin (33ppm) on nitrogen, starch and fibre digestion in the lactating dairy cow and found that compared with control cows, monensin reduced rumen degradation of protein allowing greater flow of amino acids to the small intestine. Also Haimoud et al. (1995) in a study of non-lactating dairy cows also observed increased flow of nitrogen in the form of essential and nonessential amino acids to the duodenum where increased rates of absorption were also observed.

1.3. Effect of monensin administration on glucose level

There is no effect of monensin on glucose level and these results could attributed to glucose precursors, primarily propionate and amino acids, become essential for a successful lactation. Most of this glucose is produced by liver, and propionate is the single largest contributor to liver glucose production. Glucose synthesis must increase to meet the needs of lactose synthesis. Lactose concentration is fairly constant in milk. Glucose is also used to generate reducing equivalents for the synthesis of milk fat (Angel, 2005).

Stephenson et al. (1997) reported that monensin treated-cows had significantly lower glucose values in the immediate precalving period. However Other researchers have reported significantly higher glucose concentrations in monensin treated cows postcalving (Duffield et al., 1998a and Abe et al., 1994).

Russell (1989) found a significant increase in body weight of dairy cow treated with monensin and this result could be attributed to monensin shifts the microbial population in the rumen by promoting the growth of more efficient bacteria involved in carbohydrate metabolism. This results in an increase in propionate production in the rumen. Thus, more energy is obtained from every pound of feed. Also increase feed efficiency through increase feed digestibility.

1.4. Effect of monensin administration on cholesterol level

Gerloff et al. (1986) and Kaneene et al. (1997) found that higher cholesterol values resulted from there is greater lipoprotein export from the liver.

Stephenson et al. (1997) reported that monensin treated-cows had significantly lower β-hydroxybutyrate and nonesterified fatty acids values precalving. However, those data were generated in only 24 cows from two dairy farms and they were managed under a pasture feeding system. This finding was attributed to improved liver function through reduced liver fat deposition. The results reflect less fat transported to the liver (lower nonesterified fatty acids precalving) combined with greater fat export from the liver (higher cholesterol) which supports the hypothesis that monensin inhibits accumulation of triglycerides in the liver of peripartum dairy cows.

Green et al. (1999) reported a tendency for lower serum β-hydroxybutyrate concentrations during the last 2 week precalving in cows treated with a monensin at 3 week before expected calving compared with placebo treated-cows.

2. Effect of monensin on growth and body weight compositions

Monensin sodium is widely used to improve feed efficiency of feedlot cattle, and its effects on the modulation of ruminal fermentations are well known (Bergen and Bates, 1984).

The positive effect of monensin supplementation is its ability to fatten ruminants, which is due to several factors, the most important of which is the increase in ruminal propionate production at the expense of ruminal acetate production.. The responses of growing cattle to monensin can vary with the forage and concentrate contents of the diet. The shifts in volatile fatty acids production by monensin might be beneficial for dairy cows fed high forage diets (Bonsembiante and Andrighetto, 1984).

Monensin is often included in beef cattle diets to control bloat and improve performance. However, intake and performance are sometimes decreased when monensin is included in diets that contain high concentrations of minerals, such as molasses or recycled poultry bedding-based diets (Poore and Rogers, 1998).

Feeding monensin increases weight gain in beef cattle (Dam et al., 1978), diary heifers (Baile et al., 1989), and decreases the age at puberty in beef heifers (McCartor et al., 1979). These effects of monensin potentially could decrease the age at first calving. Although little research has been conducted utilizing *dairy* heifers, the potential benefit of feeding monensin to *dairy* heifers may be decreased age at breeding and subsequent age at calving.

3. Potential Environmental Benefits of Ionophores in Ruminant Diets

The N emissions from manure are both regional and global concerns, because N produced in areas with high concentrations of livestock can move in air currents to urban areas with high population densities where air quality is likely to be a problem, and even from one country to another. Federal and State regulations requiring nutrient management plans by farms with concentrated animal feeding operations are being implemented to protect air and water quality (Asman et al., 1998).

Implementation of comprehensive nutrient management plans on farms may improve efficiency of nutrient utilization; decrease imported nutrients, and nutrient loss to the environment while improving farm profitability. The major opportunity to reduce nutrient losses is through animal diet modification. Absorbed protein (amino acids that are digested and absorbed in the small intestine) that is not synthesized into tissue or milk is excreted in the urine as urea N, which is converted to a volatile form (primarily NH_3) and escapes to the environment (Klausner et al., 1998 and Wang et al., 2000a, b)

Emissions of ammonia (NH_3), nitrous oxide (N_2O), and methane (CH_4) to the environment affect water quality and human health and contribute to greenhouse gases. Emissions of N have been associated with adverse effects on human health (knobeloch et al., 2000) and marine ecosystems (Burkart and James, 1999). Human health problems affected by excess N emissions include chronic bronchitis and asthma attacks (McCubbin et al., 2002).

Luis et al. (2003) found that monensin in the diets of ruminants may decrease protein degradation in the rumen and may increase feed protein utilization by an average of 3.5 percentage units. These changes would have an effect in reducing N losses and decreasing fecal N and the amount of protein that must be fed to meet animal requirements. Additionally, CH_4 is produced by enteric fermentation in ruminants, which is responsible for about 33 to 39% of CH_4 emissions from agriculture. Ionophores can reduce CH_4 production by 25% and decrease feed intake by 4% without affecting animal performance.

Material and methods

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I- Material:

1)Rumensin[R]:

Rumensin was kindly obtained from Elanco Company for pharmaceutical preparation, Egypt.

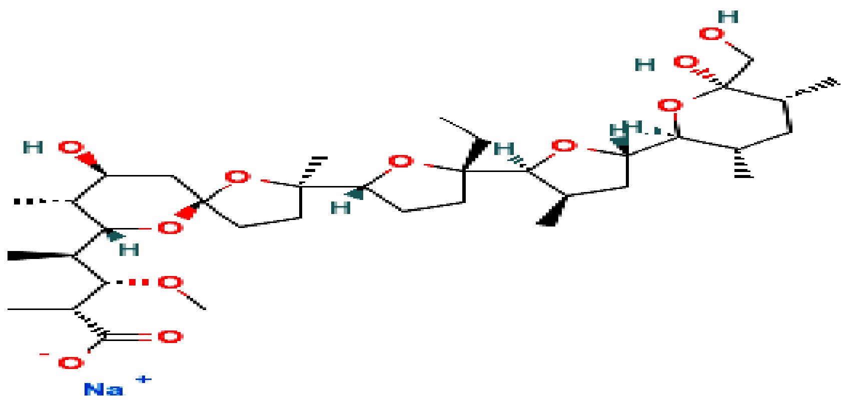
Common name : Monensin

Trade name : Rumensin

Chemical name: sodium (2R,3S,4S)-4-[(2R,5R,7S,8R,9S)-2-[(2R,5S)-5-ethyl-5-[(2S,3R,5S)-5-[(2S,3S,5R,6S)-6-hydroxy-6-(hydroxymethyl)-3,5-dimethyl-oxan-2-yl]-3-methyl-oxolan-2-yl]oxolan-2-yl]-9-hydroxy-2,8-dimethyl-1,6-dioxaspiro[4.5]decan-7-yl]-3-methoxy-2-methyl-pentanoate

Chemical formula: $C_{36}H_{61}NaO_{11}$

Empirical formula:



Molecular Weight: 692.853g/mol

2)-Kits:

1. Total protein kits (dp international)
2. 2. Albumin kits (Dimond Diagnostics).
3. Glucose kits (Spinreact)
4. Urea kits (Dimond Diagnostics)

5. Cholesterol kits (Spinreact)
6. Total bilirubin Kits (APC Diagnostics)

3)-Equipment:

Spectrophotometer (Hang Fen 7230, china)

Automatic pipettes

4) Experimental animals:

20 Holstein dairy cows were fed on total mixed ration (TMR) which consists of silage, corn, soy bean, cotton seed cake, hay, mineral mixtures and vitamins mixtures.

Total mixed ration (TMR)

Ingredient	Ratio by kg/ton
Silage	450.00
Corn	150.00
Soy bean	140.00
Cotton seed cake	180.00
Hay	250.00
Mineral mixtures	1.00
Vitamins mixtures	1.00

Methods

Monensin treated animals:

We examined the effects of monensin on feed intake and milk production in Holstein cow fed Total mixed ration. Diets were fed for ad libitum intake four times a day and water was also available for ad libitum intake. The experimental period lasted 3 wk and comprised 2 wk of adaptation to monensin, as recommended by Thornton and Owens (1981), and 3 wk of experimental observations. The daily individual dose of the monensin premix was mixed with 140 g of Soy bean meal at dose of 10g/ ton and then added to the diet of the specific cow. The cows were milked twice daily and milk production of each cow was recorded daily. Blood samples were collected into sterile tubes for separation of serum. Serum was analyzed for urea, glucose, cholesterol, total bilirubin, total protein and albumin levels

1. Biochemical analysis:

a- Determination of serum total protein was determined according to the method of Henery (1964).

b- Determination of serum albumin was determined according to the method of Doumnas et al. (1971).

c- Determination of serum glucose level:

Serum glucose level was determined according to the method of Kaplan (1984).

d- Determination of serum bilirubin level:

Serum bilirubin was determined according to the method of Jendrassik and Grof (1938).

g- Determination of serum urea level:

Serum urea was determined according to the method of Patton and Crouch (1977).

h- Determination of serum cholesterol level -

Serum cholesterol was determined according to the method of Naito and Kaplan (1984).

2- Weighting of animals before and after treatment to assess effect of monensin on body weights.

3- Weighting of daily milk yield of each animals to assess effect of monensin on milk yield.

4. Statistical analysis:

Data obtained in this study were statistically analysed for variance (ANOVA), and least significant difference (LSD) as described by *Snedcor and Cochran, 1989)* by using computerized SPSS version 10.0.

Results

1-Biochmical changes due to administration of monensin

Monensin treated animals showed significant increase in total protein serum level, globulin serum level, urea serum level, cholesterol serum level and total bilrubin serum level while had no effect on both albumin and glucose serum levels . These results illustrated in table (1) and fig (1)

Table (1) Showing biochemical changes due to monesin administration at dose of 10 gm/ton for dairy cow

	Total protein g/dl		**Albumin g/dl**		**Globulin g/dl**		**Urea mg/dl**		**Glucose mg/dl**		**Cholesterol mg/dl**		**Total Bilirubin mg/dl**	
	T	**C**	**T**	**C**	**T**	**C**	**T**	**C**	**T**	**C**	**T**	**C**	**T**	**C**
Monensin treated animals	32.7	19.1	3.9	4.6	28.8	14.5	64.3	32.2	63.7	59.8	355	287	18	17.5
	30.7	19.2	6.5	3.9	24.2	15.8	58.4	37	60.4	59	228	172	20.5	20.8
	33.7	20	4.6	3.9	29.3	16.1	37.9	44	65.9	59	211	169.7	19.4	19
	38.5	18	3.7	4.1	34.8	13.9	65.6	35	64.5	60	204	172	23	22.8
	37.4	18.7	4.5	4.2	32.6	14.5	38.2	45	52.9	61	212	177	19.9	20.9
	27.3	19.7	4	4	23.3	15.7	53.4	46	60	57	229	178	22	21.7
	27.2	17	4	4.5	32.2	12.5	43.9	37	60	60	203	200	23	23
	31	18	4	3.7	27	14.3	64	38	62	62	325	175	21	19.9
	26.4	19	5	3.5	21.4	15.5	38	44	62	61	221.6	185	22	22.8
	32.9	19	3.9	4.6	29	14.4	40	37	59	60	210	186	20.4	19.4
Mean	31.8^{a}	18.8^{b}	4.41^{a}	4.1^{a}	27.8^{a}	14.7^{b}	50.4^{a}	39.5^{b}	61^{a}	59.9^{a}	239.8^{a}	190^{b}	20.8^{a}	20.7^{a}
S. E.	±1.3	±0.28	±0.8	±0.34	±3.89	±0.98	±3.8	±1.5	±1.1	±0.4	±17.8	±11.8	±0.5	±0.5

A, b, c, d: Different letters are significantly different between groups at P≤ 0.01%

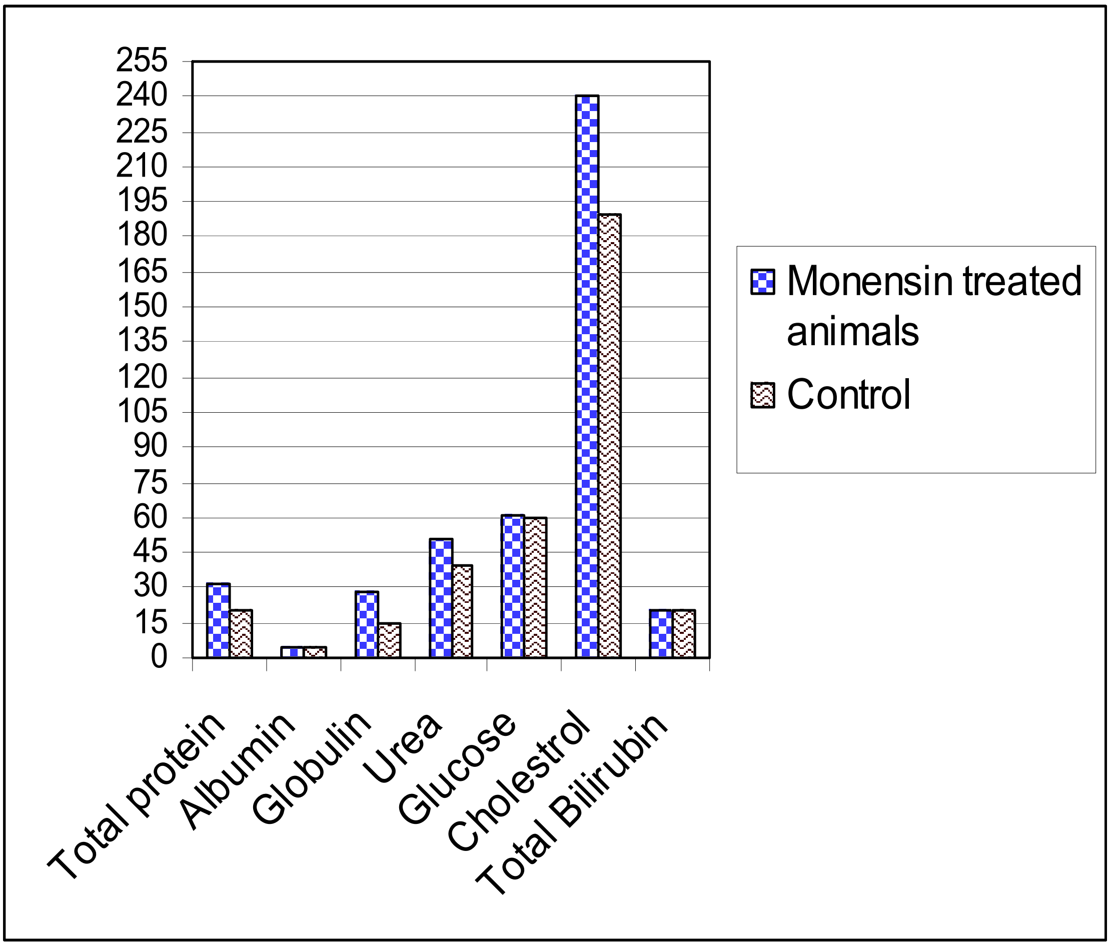


Fig. (1): Showing biochemical changes due to monesin administration at dose of 10 gm/ton for dairy cow

2. Effect of administration of monensin on both body weights and daily milk yield

Monensin treated animals showed significant increase in both body weight and daily milk yield. These results illustrated in table (2) and fig (2).

Table (2): showing the effect of monensin adminsitration at dose of 10 gm/ton on body weights and milk yeild of dairy cows

	Body weights		**Milk yeild**	
Monensin treated animals	**T**	**C**	**T**	**C**
	580	500	23	20
	550	490	22	21
	530	450	23	20
	585	480	20	19
	590	465	23	19.5
	600	500	25	21
	600	520	25	22
	545	480	27	23
	540	460	24	20
	535	480	25	21
Mean	565.5^{a}	482.5^{b}	23.7^{a}	20.65^{b}
S.E.	±25.4	± 18.9	±1.8	±1.08

A, b, c, d : Different letters are significantly different between groups at P ≤0.01%

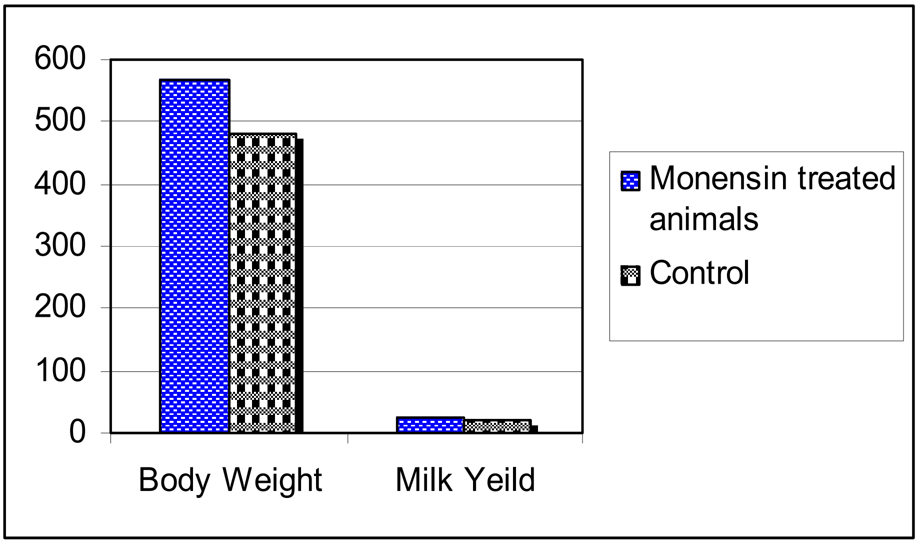


Fig. (2): Showing the effect of monensin adminsitration at dose of 10 gm/ton on body weights and daily milk yeild of dairy cows.

Discussion

Rumensin (monensin) is the first ionophore to be approved by the Food and Drug Administration (FDA) for increased milk production efficiency (production of marketable 4.0% solids-corrected milk per unit of feed intake) when fed to dairy cows.

There are a closely link between the amount of feed consumed and amount of milk production (Hutjens, 2003 and Britt et al., 2004)

The current study supports earlier trials, which established that the inclusion of monensin in dairy cow diets would increase milk yield (Lean and Wade, 1997). The likely mechanism of action to support additional milk yield is that monensin increased the supply of glucogenic precursors resulting from changes in pattern of rumen fermentation.

Increases in blood urea nitrogen due to monensin in dairy cows have been reported previously (Duffield et al., 1998a ; Hayes et al., 1996). These studies had much larger sample sizes, which could explain why they obtained significant increases, whereas only numeric increases were observed in our study. Duffield et al. (1998a) suggests that this increase is due to a greater supply of bypass protein to the small intestine and a subsequent increase in the use of absorbed nonessential AA for gluconeogenesis. This would lead to a rise in deamination of these AA and higher concentration of BUN. The significant increase in apparent digestibility postcalving and the numeric increase in this digestibility precalving found in our study supports this theory. Also agreed with Haimoud et al (1995) who investigated the effect of monensin (33ppm) on nitrogen, starch and fibre digestion in the lactating and dried dairy cow and found that compared with control cows, monensin reduced rumen degradation of protein allowing greater flow of amino acids to the small intestine. In the same hand, increased milk and blood urea concentration resulted because both parallel dietary Crud Protein content (Broderick and Clayton, 1997).

There is no effect of monensin on glucose level and these results could attributed to glucose precursors, primarily propionate and amino acids, become essential for a successful lactation. Most of this glucose is produced by liver, and propionate is the single largest contributor to liver glucose production. Glucose synthesis must increase to meet the needs of lactose synthesis. Lactose concentration is fairly constant in milk. Glucose is also used to generate reducing equivalents for the synthesis of milk fat (Angel, 2005). Glucose concentrations were not significantly affected by monensin in the current study. However, numerical trends support previous studies. There may have been a lack of power to illustrate significant effects in the current project. Stephenson et al. (1997) disagreed with our study and reported that monensin treated-cows had significantly lower glucose values in the immediate precalving period. Other researchers have reported significantly higher glucose concentrations in monensin treated cows postcalving (Duffield et al., 1998a; Abe et al., 1994).

The higher cholesterol values suggest that there is greater lipoprotein export from the liver (Gerloff et al., 1986; Kaneene et al., 1997). The data are consistent with Green et al. (1999) who reported a tendency for lower serum β-hydroxybutyrate concentrations during the last 2 wk precalving in cows treated with a monensin CRC at 3 wk before expected calving compared with placebo treated-cows. The data are also supported by Stephenson et al. (1997), who reported that monensin treated-cows had significantly lower β-hydroxybutyrate and non esterified fatty acids values precalving. However, those data were generated in only 24 cows from two dairy farms and they were managed under a pasture feeding system. This finding was attributed to improved liver function through reduced liver fat deposition. In the current study the results reflect less fat transported to the liver (lower nonesterified fatty acids precalving) combined with greater fat export from the liver (higher cholesterol) which supports the hypothesis that monensin inhibits accumulation of triglycerides in the liver of peripartum dairy cows.

There was a significant increase in body weight of dairy cow treated with monensin and these result could be attributed to Monensin shifts the microbial population in the rumen by promoting the growth of more efficient bacteria involved in carbohydrate metabolism. This results in an increase in propionate production in the rumen (Russell, 1989). Thus, more energy is obtained from every pound of feed. Also increase feed efficiency through increase feed digestibility and this agreed with Duffield et al. (1998a) suggests that this increase is due to a greater supply of bypass protein to the small intestine and a subsequent increase in the use of absorbed nonessential AA for gluconeogenesis. This would lead to a rise in deamination of these AA and higher concentration of BUN. The significant increase in apparent digestibility postcalving and the numeric increase in this digestibility precalving found in our study supports this theory.

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Conclusion

Any improvement in the conversion of feed to milk has a direct impact on the profit margin of the dairy farm. Our study found that monensin treatment at dose of 10 gm /ton in total mixed ration lead to increase both milk production and body weight through its effect on increase feed digestibility, microbial digestion and also decrease losses of nitrogen in feces which lead to decrease environmental hazards of nitrogen on both animal and public health.

References

Abe, N., I. J. Lean, A. Rabiee, J. Porter, and C. Graham.(1994): Effects of sodium monensin on reproductive performance of dairy cattle. II. Effects on metabolites in plasma, resumption of ovarian cyclicity and oestrus in lactating cows. Aust. Vet. J. 71(9):277–282.

Angel (2005): Milk Production Efficiency in Dairy Cows Fed Monensin. Aguilar, Proc. Southwest Nutr. Conf.: 192-196b

Asman, W.A.H., M.A. Sutton, and J.K. Schjorring. (1998): Ammonia Emission, atmospheric transport and deposition. New Phytol. 139:27–48

Baile, C. A, C. L. McLaughliq W. V. Chalupa, D. L. bSnyder, L. C. Pendlum, and E. L. Potter. (1982): Effects of monensin fed to replacement *d;ury* heifers during the growth and gestation period on *growth,* reproduction, and subsequent lactation. J. Dairy Sci. 621941

Beckett, S.; Lean, 1 I. ; Dyson, R.; Tranter, W and Wade, I(1998): Effects of Monensin on the Reproduction, Health, and Milk Production of Dairy Cows. J Dairy Sci 81:1563–1573

Bergen, W. G., and D. B. Bates (1984): Ionophores: their effect\ on production efficiency and mode of action. J. Anim. Sci. 58: 1465.

Bonsembiante, M., and I. Andrighetto. (1984): The use of monensin in the fattening of young bulls fed with maize silage or corn stalk silage. Zootec. Nutr. Anim. 10:121.

Britt, J.S., R.C. Thomas, N.C. Speer, and M. B. Hall. (2004): Efficiency of converting nutrient drymatter to milk in Holstein herds Journal of Dairy Science 86: 3796-3801. Gaines, W. E.

Broderick, G. A., and M. K. Clayton. (1997): A statistical evaluation of animal and nutritional factors influencing concentrations of milk urea nitrogen. J. Dairy Sci. 80:2964–2971

Burkart, M.R., and D.E. James. (1999): Agricultural nitrogen contributions to hypoxia in the Gulf of Mexico. J. Environ. Manage. 28:850–859.

Dam, R. M., J. A. Boling, and N. W. Bradley. (1978): Supplemental protein withdrawal and monensin in corn silage diets of finishing steers. J. *Anim. Sci. 46:* 345.

Doumnas , B. et al. (1971): a colorimetric method for determination of albumin chem. acta

Duffield, T. F., D. Sandals, K. E. Leslie, K. Lissemore, B. W. McBride, J. H. Lumsden, P. Dick, and R. Bagg. (1998a.): Effect of prepartum administration of monensin in a controlled-release capsule on postpartum energy indicators in lactating dairy cows. J. Dairy Sci. 81:2354–2361.

Gerloff, B. J., T. H. Herdt, and R. S. Emery. (1986.): Relationship of hepatic lipidosis to health and performance in dairy cattle. JAVMA 188:845–850.

Granzin, B.C. and Dryden, G. M. C. L. (1999): The effects of monensin on milk production and levels of metabolites in blood and rumen fluid of Holstein-Friesian cows in early lactation. Australian Journal of Experimental Agriculture 39: 933-940

Green, B. L., B. W. McBride, D. Sandals, K. E. Leslie, R. Bagg, and P. Dick. (1999): The impact of a monensin controlled-release capsule on subclinical ketosis in the transition dairy cow. J. Dairy Sci. 82:333–342.

Haımoud, D. A., M. Verney, C. Bayourthe, C., and R. Montcoulon. (1995): Avoparcin and monensin effects on the digestion of nutrients in dairy cows fed amixed diet. Can. J. Anim. Sci. 75:379–385

Hays, D. P., Pfeiffer, D. U., and Williamson, N. B. (1996): Effect of intraruminal capsules on reproductive performance and milk production of dairy cows fed pastures. J. Dairy Sci. 79:1000-1008.

Henry, R. J. (1964): clinical chemistry, Harber & Row Publishers, New York p. 181.

Hutjens M. (2003): Feeding Guide. 2nd. Ed. W. D. Hoards and Sons Co. Kube JC, Shirley JE, Smith TD and Frey RA. Effects of monensin supplementation on lactating dairy cows. J Dairy Sci 71(Suppl 1): 218

Jendrassik, L. and Grof, P. (1938): a colorimetric method for determination of bilirubin. Biochem. 7297, 61, 1938.

Kaplan, L. A. (1984): Glucose. Clin Chem the C.V. Mosby CO. St Louis. Toronto. Princeton 1984; 1032-1036.

Kaneene, J. B., R. Miller, T. H. Herdt, and J. C. Gardiner. (1997): The association of serum NEFA and cholesterol, management and feeding practices with periparturient disease in dairy cows. Prev. Vet. Med. 31:59–72.

Klausner, S.D., D.G. Fox, C.N. Rasmussen, R.E. Pitt, T.P. Tylutki, P.E.

Wright, L.E. Chase, and W.C. Stone. (1998): Improving dairy farm sustainability I: An approach to animal and crop nutrient management planning. J. Prod. Agric. 11:225–233

Knobeloch, L., B. Salna, A. Hogan, J. Postle, and H. Anderson. (2000). Growth promoters decrease Blue babies and nitrate-contaminated well water. Environ. Health N-excretion in fattening cattle. Perspect. 108:675–678.

Kube JC, Shirley JE, Smith TD and Frey RA (1988). Effects of monensin supplementation on lactating dairy cows. J Dairy Sci 71(Suppl 1): 218

Lean, I. J., and L. Wade. (1996): Effects of monensin on metabolism,production, and health of dairy cattle. Pages 50–70 *in* Usefulnessof Ionophores in Lactating Dairy Cattle. K. L. Leslie, ed. Univ. Guelph, Canada.

Luis Orlindo Tedeschi; Danny Gene Fox and Thomas Paul Tylutki (2003) Potential Environmental Benefits of Ionophores in Ruminant Diets J. Environ. Qual. 32:1591–1602 (2003).

Lynch GA, Hunt ME and McCutcheon SN. (1990): A note on the effect of monensin sodium administered by intraruminal controlled release devices on productivity of dairy cows at pasture. Anim. Prod. 51:418-421

McCartor, M. M, R D. Randel, and L. H. Carroll. (1979): Dietary alteration of ruminal fermentation *on* eficiency of growth and onset of puberty in Braagusheifers. J. Anim. Sci. 48:488

McCubbin, D.R., B.J. Apelberg, S. Roe, and F. Divita, Jr. (2002): Improving dairy farm sustainability II: Environmental losses stock ammonia management and particulate-related health Environ. Sci. Technol. 36:1141–1146.

Mohsen MK, El-Kerab F and El-Safty MS (1981): Effect of monensin on milk yield, milk composition and reproductive performance of Friesian cows. Agric Res Rev 59: 15- 27

Naito, H. K. and Kaplan, A. (1984): Cholesterol. Clin Chem the C.V. Mosby CO. St Louis. Toronto. Princeton 1984; 1194- 11206 and 437

NRC. (2001): Nutrient Requirements of Beef Cattle. 7th ed. Natl. Acad. Press, Washington, DC.

Patton, C. J. and Crouch, S. R. (1977): a colorimetric method for determination of serum urea. Anal. Chem., 1977. 49:464-469

Poore, M. H., and G. M. Rogers. (1998): Response of growing calves fed broiler litter-based diets to common feed additives. J. Anim. Sci. 76(Suppl. 2):19.

Raun A. P (1990): Rumensin then and now. In Rumensin in the 1990s. Elanco Animal Health, Indianapolis, pp A1-A20.

Russell JB and Strobel HJ. (1989): Effect of ionophores on ruminal fermentation. Appl Environ Microbiol; 55: 1-6

Snedecor, George W. and Cochran, William G. (1989): Statistical Methods, Eighth Edition, Iowa State University Press.

Stephenson, K. A., I. J. Lean, M. L. Hyde, M. A. Curtis, J. K. Garvin, and L. B. Lowe. (1997): Effects of monensin on the metabolism of periparturient dairy cows. J. Dairy Sci. 80:830–837.

Thornton, J. H., and F. N. Owens. (1981): Monensin supplementationand in vivo methane production by steers. J. Anim. Sci. 52:628

Wang, S.-J., D.G. Fox, D.J.R. Cherney, L.E. Chase, and L.O. Tedeschi. (2000b): Whole herd optimization with the Cornell net carbohydrate and protein system. III. Application of an optimization model to evaluate alternatives to reduce nitrogen and phosphorus mass balance. J. Dairy Sci. 83:2160–2169