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THE EFFECT OF 2 COMMERCIAL FEED ADDITIVES AND FLAVOMYCIN ON INTESTINAL MICROFLORA, BROILERS' PERFORMANCE AND AS FEED PRESERVATIVES

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ABSTRACT

One hundred and twenty two, one day old male Ross broiler chicks were used to evaluate the effect of Salkil, Prefect (two commercial feed additives) and Flavomycin (Antimicrobial growth promoter) on performance and on intestinal microflora. The chicks were divided into six groups: a) control with no additives, b) as control group but supplemented with 4 kg/ton Salkil during the whole period of the experiment (42 days), c) as control group but supplemented with 4 kg/ton Salkil during starting period and 2 kg/ton Salkil during the rest of the experiment, d) as control group but supplemented with 3 kg/ton Prefect during the whole period of the experiment, e) as control group but supplemented with 3 kg/ton Prefect during starting period and 2 kg/ton in the rest of the experiment (42 days) and f) as control group but supplemented with 125 g /ton Flavomycin during the whole period of the experiment. Another trial was performed to evaluate these compounds as feed preservatives by storage of feed supplemented with the examined compounds. Samples were collected biweekly intervals up to 8 weeks. Results revealed that no significant effect was noticed with the addition of Salkil or Prefect on body weight gain of broiler chicks or feed efficiency compared to the control group, but there was a numerical improvement in broiler performance in group C. An increase in the count of caecal lactic acid bacteria in group C and D indicated that the supplementation of feed with the conditions followed in these two groups has an acidifying effect in the intestine of the treated chicks. As feed preservative, the best results were obtained by supplementation of feed with 3 km/ton of Prefect.

INTRODUCTION

Antibiotics have been used since 1949 in poultry feed at very low concentration to serve as growth promoter. The growth promotion of antibiotics is mainly due to their effect on the intestinal tract microflora.

Recently, most of the European countries banned the use of antibiotics as a feed additive for animal and poultry. It is anticipated that Egypt will soon follow the European community decision of prohibiting the use of antibiotics as growth promoters in animal and poultry feeds. It is therefore of great interest to study the effect of using nutritionally safe materials to compensate the absence of antibiotics in poultry feed.

Many carboxylic acids are known to have bactericidal effect. Lactic acid present from Lactic acid bacteria in the intestine is known long ago to have bactericidal effect to coliforms (Kalchayanand *et al*., 1992). Voget *et al*., (1981) found that fumaric acid (a dicarboxalic acid) reduced the number of bacteria in broiler's small intestines. The addition of 0.5 or 1.0% fumaric acid significantly improved body weights of broilers but did not affect feed utilization efficiency (Patten and Waldroup, 1988). Also Skinner *et al*. (1991) found improved body weight gain and feed utilization efficiency when using 0.125 and 0.250% fumaric acid.

Short-chain fatty acids have bactericidal effect (Tomis and Foegeding, 1993). Humphry and Lanning (1988) reported that some short chain fatty acids reduced prevalence of Salmonella infection in laying hens. Propionic acid (propionic 3:0) as a feed additive was found to have bactericidal and bacteristatic effect in poultry production (Rouse *et al*., 1980). Izat *et al*. (1990) reported that, the addition of organic acids (fumaric and propionic) to pigs and chickens' feed reduced the incidence of Salmonella.

In situ production of propionic, other volatile fatty acids and lactic acid in the caeca of chicks as a result of inoculation with competitive exclusion bacterial cultures had a great effect on preventing or limiting Salmonella infection than has the provision of chicks with dietary organic acids (Hinton *et al*., 1991, El-Borollosy *et al*., 2001).

Organic acids are in general effective in reducing the number of bacteria in the feed. They are also effective in the upper part of the digestive tract. In this respect, Larsen *et al*. (1993) found that, the buffered propionic, citric, sorbic and benzoic acids significantly reduced Salmonella contamination of feed by almost two log orders per gram when compared to the untreated control.

Hume *et al*. (1993) reported that, sufficient amounts of propionic acid to serve as an agent against Salmonella can be delivered to the crop via feed additives approach. He added that, it seems unlikely that dietary propionic acid will affect the lower digestive tract of chickens in a manner sufficient to create an effective anti-Salmonella environment. In this respect also, Thompson and Hinton (1997) reported that, the combination of acids found in crop content of hens when bio-add was included in the diet, were bactericidal for Salmonella, despite the reduction of Lactic acid bacteria. The incorporation of 6.8-12.0 gm/Kg Bio-add although bactericidal in vitro, would not necessarily protect against a large dose of Salmonellae. Hume *et al*. (1993) reported that, orally administered propionic acid is largely (75%) used as an energy source or is metabolized and assimilated into body components if any dietary propionic acid reaches the lower digestive tract and the caeca.

Poultry enteritis and mortality syndrome (PEMS) development in turkey appears to be influenced by E.coli, Salmonellae and other Enterobacteriaceae (Edens *et al*., 1997). In this respect Roy *et al*. (2002) using a commercial product containing primarily Propionic acid reported that, such product might be a potential nutritional intervention during PEMS.

The present work is aimed at studying the effects of using commercial products on broiler performance, microorganisms in some parts of the digestive tract and as a feed preservative.

MATERIALS AND METHODS

Effect of using Salkil and Prefect on the performance of broiler chicks:
Chicks:

One hundred and ninety two, one day old male Ross broiler chicks were used in the present work, housed in boiler cages of the Animal Experimental Dept of Central Lab. For Food and Feed. The chicks were divided into six groups and each treatment involved 32 chicks, divided into 4

replicates of 8 chicks: a) Control with no additives. b) As control group but supplemented with 4 kg/ton Salkil during the whole period of the experiment (42days). c) As control group but supplemented with 4 kg/ton Salkil during starting period and 2 kg/ton Salkil during the rest of the experiment. d) As control group but supplemented with 3 kg/ton Prefect during the whole period of the experiment. e) As control group but supplemented with 3 kg/ton Prefect during starting period and 2 kg/ton in the rest of the experiment. f) As control group but supplemented with 125 g/ton Flavomycin during the whole period of the experiment.

Feed:

Chicks were fed on 3 feeds: starter, grower and finisher, formulated to satisfy NRC (1994) recommended requirement (Table 1).

Table (1): Composition of feeds used in acidifiers experiment

	Starter (1-14)	**Grower (15-28)**	**Finisher (29-42)**
Yellow corn (8.2%)	57.90	61.56	66.565
Soybean meal (46%)	29.08	25.50	22.000
Corn gluten meal (62.5%)	7.00	5.645	4.800
Vegetable oil	1.98	3.30	2.95
Di-Ca-P	2.253	2.16	1.96
Limestone	0.462	0.390	0.420
Mineral &Vitamin mixture	0.400	0.400	0.400
Salt	0.300	0.300	0.300
Choline	0.075	0.075	0.075
L-Lysine	0.360	0.230	0.340
DL-Meth	0.190	0.440	0.200
	100	100	100
CP%	23.04	20.97	19.11
ME	3107	3212	3215
Ca	0.96	0.90	0.85
AVP	0.50	0.48	0.44
Lys.	1.36	1.30	1.13
Meth.	0.53	0.52	0.47

D: As "A" but supplementing starter, grower and finisher with 3 kgP refect / ton.
E: As "A" but supplementing starter feed with 3kg Prefect / ton and grower and finisher feeds with 2 kg prefect / ton.
F: As "A" but supplementing starter, grower and finisher with flovomycine.

Measurements

A – Chemical analyses:

-Proximate composition according to A.O.A.C. (1998)

-Amino Acid analyses using High Performance Amino Acid Analyzer, Beckman using it's manual.

B- Birds performance:

-Weight gain, feed efficiency and mortality rate.

Microbiological study

In vivo studies

Four chicks from each of the six groups used for the performance study were slaughtered every 2 weeks and caeca were collected from the

selected chicks under complete aseptic condition and examined microbiologically to make the following microbiological evaluation: Total Mesophillic Count (TMC), E.coli, lactic acid bacteria (LAB) and Salmonella. The caeca also examined to estimate the pH of its content.

In vitro studies

Microbiological examination was applied to 3 types of feed:

-Feed with no additives. (Feed A in performance study).
-Feed supplemented with 4 Kg Salkil /ton (Feed B in performance study).
-Feed supplemented with 3kg Prefect /ton (Feed D in performance study).

The control and the supplemented feeds were stored up to 8 weeks and samples were collected from each feed every 2 weeks to examine the effect of storage time on the microflora present.

The microbiological evaluation of feed samples included:

TMC, Total Enterobacteriaceae Count (TEC), Total Coliform Count (TCC), Faecal Coliform Count (FCC), Staphylococcus Count, Bacillus cereus count, Salmonella detection and Total Fungi Count (TFC).

Methods

-FCC, TEC and isolation and identification of Bacillus cereus were carried out according to NMKL 1996, 2000 and 1997 respectively.
-TMC, Staphylococcus count, isolation and identification of Samonella were performed according to NMKL 1999.
-Enumeration of LAB was performed according to Onggo and Fleet 1993.
-TCC and TFC were done according to NMKL 1995.

RESULTS

Effect of supplementing broiler's feeds with acidifiers (Salkil or Prefect) on their performance

No Significant effect was noticed on the addition of Salkil or Prefect on body weight gain of broiler chicks or feed efficiency, compared to a control group receiving no acidifiers or antibiotics (Table 2) however, the data on (Table 2) shows some numerical improvements in broiler performance fed on feed C which was supplemented with 4 kg/ton Salkil during the starter period and 2 kg/ton Salkil during grower and finisher periods. These were observed in the following manifestations:

-Efficiency of feed utilization was the best for treatment C (not significant) during the starter period.
-Body weight gain was the highest (not significant) for treatment C among all other treatments during the growing period (4.9 % higher than the control)
-The overall growth period (1-42 days) showed that treatment C gave numerically the highest body weight gain (3.5 % higher than the control) compared to all treatments, but the difference was not significant.

Mortality rate is shown in Table 2. Chicks fed on Salkil supplemented feed showed lower mortality rate than treatment A (control), D and E (Perfect supplemented diets).

Effect of supplementing broiler's feeds with acidifiers (Salkil or Prefect) on bacterial count in caecum:-

Table (2): Male broiler performance:

Items	Treatments					
	A control	B Salkil 4 kg	C Salkil 4/2 kg	D prefect 3 kg	E prefect 3/2 kg	F Flavomycin
Starter Period (1-14) Body Weight (g)	328 a	326 a	321 a	323 a	319 a	324 a
Body Weight gain (g)	286 a	284 a	279 a	281 a	276 a	275 a
Feed Intake (g)	399 a	398 a	384 a	397 a	392 a	394 a
Feed Conversion ratio	1.40 a	1.41 a	1.38 a	1.42 a	1.42 a	1.43 a
Grower period(15-28) Body weight (g)	1144 a	1090 a	1177 a	1119 a	1126 a	1136 a
Body weight gain (g)	816 a	764 a	856 a	796 a	807 a	812 a
Feed Intake (g)	1323 a	1302 a	1411 a	1301 a	1341 a	1356 a
Feed Conversion ratio	1.62 a	1.70 a	1.65 a	1.63 a	1.66 a	1.67 a
Finisher period(29-42) Body weight (g)	2033 a	2031 a	2104 a	2025 a	1975 a	1996 a
Body weight gain (g)	889 a	941 a	927 a	906 a	849 a	860 a
Feed Intake (g)	1946 a	1990 a	1994 a	1890 a	1878 a	1814 a
Feed Conversion ratio	2.19 a	2.11 a	2.15 a	2.09 a	2.21 a	2.11 a
Entire period(1-42) Body weight (g)	2033 a	2031 a	2104 a	2025 a	1975 a	1996 a
Body weight gain (g)	1991 a	1989 a	2062 a	1983 a	1933 a	1954 a
Feed Intake (g)	3668 a	3690 a	3789 a	3588 a	3611 a	3564 a
Feed conversion ratio	1.84 a	1.86 a	1.84 a	1.81 a	1.87 a	1.82 a
Mortality%	5.0	2.5	2.5	5	5	0

The Mesophillic (Aerobic) count (TMC), E. coli (EC), lactic acid bacteria (LAB) (facultative anaerobe) and Salmonella in the caecum of birds of the experiment are shown in table 3. It is apparent that birds fed on feeds supplemented with 4 kg Salkil all-over the growth period (1- 42 days) had TMC in caecum at 2, 4 and 6 weeks of the experiment, resembled that of the control receiving feeds without acidifiers supplementation. On supplementing the starter feed with 4 kg Salkil /ton and grower and finisher feeds with 2 kg Salkil /ton, the TMC and EC were almost the same as those of control at the 4th and 6th wks. It was, however, noticed that the count of Lactic acid bacteria at the 4th and the 6th week were higher than their respectives in the control (A) or treatment B (4kg Salkil/ton allover the growing period). Supplementing the feeds all over the growth period with 3 kg prefect /ton showed increase in the count of Lactic acid bacteria over that of the control during the periods examined. On using perfect at levels 3 kg/ton for starter feed and 2 kg/ton for grower and finisher feeds, the TMC and EC showed almost the same trend as the control, but LAB increased on the 6th week. The six weak treatment of D treatment (3kg Prefect/ton feed allover the growth period) showed the same count of TMC and EC as in control but surpassed the LAB count of the control group. The same trend was noticed in treatment E (3kg Prefect/ton feed for the starter and 2 kg for grower and finisher). Using Flavomycin in broiler feeds gave almost the same trend as that of the control in respect to TMC and EC on the 6th week LAB count surpassed that of the control. Data from this table showed no difference in pH values in all treatments compared to the control group also Salmonella spp. could not be isolated from the examined samples during the whole period of work.

Table (3): Caecal bacterial changes during the experiment:-

Group / Time	TMC	EC	LAB	Salmonella	pH
Zero time	80 x 104	93 x 104	180 x 105	-ve	
A 2nd w	217 x104	47 x104	136 x105	ve-	
A 4th w	87 x104	70 x104	116 x104	-ve	
A 6th w	136 x105	64 x105	280 x104	-ve	7.63
B 2nd w	179 x104	33 x104	16 x105	-ve	
B 4th w	190 x104	31 x104	41 x104	-ve	
B 6th w	33 x105	66 x105	41 x104	-ve	7.66
C 2nd w	207 x104	175 x103	170 x104	-ve	
C 4th w	157 x104	260 x103	57 x105	-ve	
C 6th w	40 x105	41 x105	54 x105	-ve	7.30
D 2nd w	231 x104	146 x102	41 x104	-ve	
D 4th w	157 x104	211 x105	220 x104	-ve	
D 6th w	68 x105	41 x105	29/42x105	-ve	7.43
E 2nd w	33 x105	244 x104	78 x105	-ve	
E 4th w	143 x105	245 x103	180 x104	-ve	
E 6th w	34 x105	49 x105	42 x105	-ve	7.44
F 2nd w	35 x105	125 x104	124 x105	-ve	
F 4th w	61 x104	228 x103	263 x103	-ve	
F 6th w	52 x105	42 x105	160 x105	-ve	7.29

TMC = Total Mesophillic count.
EC = E.coli.
LAB = Lactic Acid Bacteria.

Effect of supplementing feeds with Salkil and Perfect on bacterial count in feeds:

Table 4 presents the different bacterial and fungi count in feeds supplemented and unsupplemented with acidifiers during biweekly intervals up to 8 weeks. It could be noticed from Table 4 that all samples drawn from feeds during the experimental period (8 weeks) were free from staphylococcus, Bacillus cereus and salmonella. On the addition of Salkil at 4kg /ton level to feed the following could be observed:-

-TMC on 0 time and after 2 and 4 weeks was not affected and was almost of the same magnitude as that of the unsupplemented feed (control), while the count on the 6th and 8th was reduced.

-Total Enterobacteriaceae count (TEC) was almost of same concentration as the control for the zero time and 2weeks period. Enterobacteriaceae was not detected in the control feed but was present in supplemented feed. Enterobacteriaceae was absent on the 6th and 8th week in both control feed and supplemented feed.

-Total coli from count (TCC) took the same trend as TEC.

-Faecal coliform count (FCC) was reduced greatly and could not be detected on the 2nd week and thereafter.

-Total fungi count (TFC) was 27x 102 cfu/gm then reduced on the following weeks.

Table (4):Bacterial changes in feed

Type / Duration	TMC	TEC	TCC	FCC	TFC	Staph	B. cereus	Salmonella
Zero time	266x102	46x102	315x102	38x10	54x103	-ve	-ve	-ve
D 2w	40x10	81x10	37x10	40x10	40x10	-ve	-ve	-ve
D 4w	38x10	1x10	1x10	-ve	24x10	-ve	-ve	-ve
D 6w	10x10	1x10	1x10	-ve	12x10	-ve	-ve	-ve
D 8w	26x10	1x10	-ve	-ve	14x10	-ve	-ve	-ve
Zero time	230x10	103x10	170x10	7x10	27x102	-ve	-ve	-ve
B 2w	73x10	25x10	10x10	-ve	34x10	-ve	-ve	-ve
B 4w	39x10	13x10	11x10	-ve	38x10	-ve	-ve	-ve
B 6w	3x10	-ve	-ve	-ve	18x10	-ve	-ve	-ve
B 8w	23x10	-ve	-ve	-ve	6x10	-ve	-ve	-ve
Zero time	44x10	7x10	20x10	-ve	114x102	-ve	-ve	-ve
A 2w	62x10	10x10	11x10	-ve	64x102	-ve	-ve	-ve
A 4w	100x10	-ve	-ve	-ve	42x10	-ve	-ve	-ve
A 6w	2x10	-ve	-ve	-ve	19x10	-ve	-ve	-ve
A 8w	30x10	-ve	-ve	-ve	43x10	-ve	-ve	-ve

TMC = Total Mesophillic (aerobic) Count.
TCC = Total Coliform Count.
FCC = Faecal Coliform Count.
TFC = Total Fungi Count.
Staph = Staphylococcus count.

On the addition of Prefect at 3 kg /ton, the count of bacteria and fungi from the start (zero time) till 8 weeks with biweekly intervals is shown in Table 4. It could be noted that:

-TMC was reduced on the 2nd week and there after compared to the zero time count.
-TEC was 96x102 on zero time was reduced to 81x10 on the 2nd week and become almost zero afterwards.
-TEC took the same trend as TEC.
-FCC could not be detected on the 4th week and thereafter compared to the count at Zero time.
-TFC was reduced greatly from 54x10 3 on zero time to 40x10 on the second week, the reduction continued with the progress of time.

DISCUSSION

The role of organic acids in broiler's raising as growth promoter has been documented and many versatile results were obtained. The mode of action of different organic acids as growth promoters are not well documented but may be attributed to decrease of the intestinal pH which creates unfavorable condition for the growth of harmful bacteria (Boiling *et al*., 2000).

Another role mentioned by El-Borollosy *et al*., 2001 who suggested that the use of dietary organic acids enhance the growth of beneficial bacteria in the intestine which utilize all the intestinal wall receptors preventing the pathogenic bacterial colonization.

Pinchasov and Elmaliah, 1994 suggested that, the role of dietary organic acids as growth promoters is through the absorption of non starch polysaccharides which cause an increase of the caecal capacity and volatile fatty acid content.

Many previous studies suggested the use of organic acids (propionic, formic, fumaric, citric and lactic acids) to improve broilers' performance (Cave 1984, Patten and Waldroup 1988, Izat *et al*., 1990, Skinner *et al*., 1991, Pinchasov and Elmaliah 1994). The positive effect of organic acids on broilers' performance has been obtained by using relatively higher doses of these acids.

Propionic acid at 10% (100 kg/ton feed) inclusion rate had positive effect on broilers' performance (Cave 1984) but failed to have any effect when used at 2%, 4% and 8%. (Izat *et al*., 1990).

Neither formic acid nor its salts have shown any promoting effect on broilers' performance when used in a level of 0.5% - 1%. (Patten and Waldroup 1988).

When lactic acid was used at a level of 3% in broilers' diet, a significant increase in the body weight gain and the performance parameters were obtained (Cave 1984).

Adding fumaric acid at 0.5% - 1% improved the weight gain of both sexes of broilers' but had no effect on feed utilization.

When citric acid was used in broilers' diet at a concentration of 6%, an increase in the performance was noticed especially in the weight gain.

In the present study, there was no significant effect of organic acids (in the form of commercial premixes containing organic acids blend) on any measured performance parameter. This result may be attributed to the inclusion rates used (recommended by the producers) which were very low compared to the effective concentrations found in the previous studies.

Flavomycin in this study was used at 0.0125% level (as recommended by the producer) and had no significant effect on the growth rate, feed utilization feed conversion and mortality rate. These results agree with that obtained by Izat *et al*. 1990 who found that the use of Flavomycin in broiler's diet in a concentration up to 0.22% had no significant effect on the final body weight, feed conversion or mortality rate.

Another effect of organic acids also is to control contamination in carcass meat through reducing the number of pathogenic bacteria and increase the number of beneficial bacteria in the intestine (Van Staden *et al*., 1980) by one or more of the modes of action described before. Results obtained from the present study concerning the effect of organic acids on the caecal bacterial content revealed an agreement with results obtained by Van Der Wielen *et al*., 2000 who concluded that, the predominant bacterial strains in the first stage of life are Enterobacteriaceae (including E.coli) and Lactic acid bacteria which have almost the same count. By increasing broilers' age, normally the count of Lactic acid bacteria (which is a useful bacteria helps in infections prevention by pathogenic bacteria) decreased giving a chance for invasion with another types of harmful bacteria which have a reverse effect not only on the broilers' health condition but also on the quality of carcass meat. By using dietary organic acids, the bacterial pattern is affected giving

the advantage to beneficial bacteria to grow and causing a decline in the growth rate of the harmful bacteria. Van Der Wielen *et al*., 2000 recorded an increase in Lactic acid bacteria count and a decline in the number of Enterobacteriaceae count after using dietary organic acids in broilers' feed. These data supports the results obtained in the present work.

Concerning the use of organic acids as feed preservatives, data obtained from this study have shown that the inclusion rate of Prefect commercial organic acid blend (3 Kg/ton feed) was effective as preservative and gave the best results on reduction of Total Enterobacteriaceae count (indicator bacteria) and Total yeast and mould counts. These results agree with the results obtained by Hansen *et al*. 1995 who gave the same results on using 10 different commercial organic acids blends.

The weak effect of Salkil as feed preservative obtained in the present work agrees with the data obtained by Hall *et al*. 1990 who proved the failure of Salkil product in eliminating Salmonella from chicken feed.

The advantage of using acid mixtures instead of pure organic acids is that, the organic acids are corrosive, sharp smelling and required special safety precautions but the commercial organic acid blends have less aggressive properties but it must be used with the appropriate concentrations.

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دراسة تاثير استخدام اضافات غذائية تجارية و الفلافوميسين على المحتوى البكتيري للامعاء و على مستوى الاداء في دجاج التسمين و تقدير فاعليتهم كمواد حافظة للاعلاف

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تم استخدام عدد ١٢٢ كتكوت ذكر(من سلالة لدجاج اللحم) عمر يوم لتقدير مدى تاثير مركبين تجاريين يستخدمان كاضافات للاعلاف و هما Prefect , Salkil و ايضا احد المضادات الحيوية و هو Flavomycin لمعرفة مدى تاثيرها على المحتوي البكتيري للامعاء و على مستوى اداء دجاج التسمين.

تم تقسيم الكتاكيت الى ٦ مجموعات:

١- مجموعة المقارنة بدون اي اضافات على الاعلاف المقدمة لها.
٢- مثل مجموعة المقارنة لكن تم اضافة Salkil بنسبة ٤ كجم/ طن علف طوال فترة التجربة (٤٢ يوم).
٣- مثل مجموعة المقارنة لكن تم اضافة Salkil بنسبة ٤ كجم/ طن علف طوال فترة البادئ ثم بنسبة ٢ كجم/ طن علف طوال فترتي النامي و الناهي.
٤- مثل مجموعة المقارنة لكن تم اضافة Prefect بنسبة ٣ كجم/ طن علف طوال فترة التجربة.
٥- مثل مجموعة المقارنة لكن تم اضافة Prefect بنسبة ٣ كجم/ طن علف طوال فترة فترة البادئ ثم بنسبة ٢ كجم/ طن علف طوال فترتي النامي و الناهي.
٦- مثل مجموعة المقارنة لكن تم اضافة Flavomycin بنسبة ١٢٥ جم/ طن علف طوال فترة التجربة.

تم اجراء تجربة اخرى لتقييم فعل هذه المركبات كمواد حافظة للاعلاف و تم ذلك عن طريق تخزين العلف المخلوط بهذه المركبات لمدة ٨ اسابيع مع اخذ عينات بصفة دورية كل اسبوعين لمتابعة الحالة الميكروبية لهذه الاعلاف.

اوضحت الدراسات التي اجريت انه لا يوجد تأثير معنوي مع اضافة هذه المركبات للاعلاف المقدمة الى بدارى التسمين مقارنة بالمجموعة المقارنة و لكن وجد تحسن رقمي فقط في مستوى اداء الدجاج الخاص بالمجموعة ٣ التي تم تغذيتها على Salkil بنسبة ٤ كجم/ طن علف طوال فترة البادئ ثم بنسبة ٢ كجم/ طن علف طوال فترة النامي و الناهي. صاحب هذه الزيادة الرقمية في دجاج المجموعة ٣ زيادة في عدد بكتريا حامض اللاكتيك مما يدل على التاثير الايجابي المباشر لهذا المركب على هذا النوع من البكتريا.

و لوحظت هذه الزيادة ايضا في المجموعة ٤ التي تم تغذيتها على Prefect بنسبة ٣ كجم/ طن علف طوال فترة التجربة.

عند استخدام هذه المواد كمواد حافظة للاعلاف, تم الحصول على افضل النتائج في الاعلاف التي تم اضافة ال Prefect لها بنسبة ٣ كجم/ طن فقد اظهرت تاثيرا ايجابيا على اعداد البكتريا و الفطريات غير المرغوب في تواجدها اثناء فترة التخزين.