Conclusions and indications for a correct use of monobutyrin

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Dr Bruno Tempesta

Introduction

I was given the honour and burden to cooperate to the development of the product in order to merge the trustworthiness and consciousness of scientific bases with the need of understanding how the product could be used everyday in the poultry industry

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This is the reason why throughout the trials we passed from an initial infection 10^7 down to a more realistic infection 10^3, in order to be as close as possible to the real infection of the poultry farm, even safeguarding the certainty of infection

Introduction

The trials carried out by the University of Florence and by the Istituto Zooprofilattico di Forlì result from a series of questions we have been asking ourselves:

1. What are the functions the product can exert in the poultry field?
2. Which of these functions may help the poultry industry to solve the problems we encounter every day on the farm?
3. When the product shows its efficacy clearly and how?

Effects of Monobutyrin

The product resulted clearly efficacious in:

1. Preventing the colonization of pathogens at the gut level, in particular Salmonella and Clostridium, (and E. Coli as well)
2. Speeding the development of the gut and its maturation
3. Depress Salmonella in infected birds

Prevention of Salmonella proliferation

The results of the Forlì trials have been illustrated already in a complete way;

Yet, it is my wish to recall some concepts arisen from the trials:

- If the proliferation of Salmonella occurred already, by using adequate concentrations of monobutyrin we are allowed to think that reducing the presence to very low levels is possible
  - in terms of positivity percentages
  - in terms of infection gravity (CFU log)

Prevention of Salmonella proliferation

It is my opinion to think of prevention of the proliferation instead of a post infection intervention because, in the second case, the required levels are decidedly higher and the birds' age older.

All this is inevitably associated with higher water and feed intakes and, hence, with higher product intakes. As a consequence, the production costs may be remarkably higher.

Prevention of Salmonella proliferation

In the trial of April 2010 (2nd salmonella trial) the chickens group was treated with 0.5% in the drinking water starting from day 15 of life (5 days after challenging with 10^3 cfu/ml Salmonella Typhimurium).

At day 25 (10 days of treatment) as high as 80% negative counts in the caeca was recorded.

A day 30 (15 days of treatment) the 100% negative counts in the caeca were reached.

Prevention of Salmonella proliferation

An enthusiastic result, considering that we are not talking of an antibiotic and considering also the limited duration of treatment (15 days at 0.5% in water).

An enthusiastic result even because the birds were not treated with monobutyrin at the moment of challenging.

Prevention of Salmonella proliferation

The adequacy or, the necessity, of the contemporary presence or, better of the prevention use of monobutyrin in case of Salmonella infection, has clearly arisen from the trial just finished in August this year (3rd salmonella trial with chickens)

Prevention of Salmonella proliferation

Birds challenged at day 12 with 5,000 cfu/ml Salmonella Typhimurium (5×10^3)

Prevention of Salmonella proliferation

(trial August 2010)

Groups 2, 3 e 4 were treated until day 14 with different amounts of monobutyrin (only two days contemporaneously with Salmonella)

Prevention of Salmonella proliferation
(trial August 2010)

Group 5 has been treated up to 7 days only (not contemporaneity of product and Salmonella).

Reading and interpreting data
(trial August 2010)

In the figures presented herein the arithmetical mean of the positive birds only was considered, not that of all the birds

This because who operates on the farm wants these two essential questions to be answered:

Reading and interpreting data
(trial August 2010)

1. What level of residual positivity do I have following the treatment (efficacy)
2. What level of seriousness does residual infection present following the treatment

Prevention of Salmonella proliferation
(trial August 2010)
Challenging at day 12 with 10^3 cfu/ml
21 days post infection the results were:

Group	Positive caeca	Cfu/caeca Intensity	Positive livers	Cfu/livers Intensity
1) Control	10/10	2370 (100%)	10/10	783 (100%)
2) 0.4%-14 d feed	8/10	412 (17%) (red. 83%)	4/10	150 (19%) (red. 81%)
3) 0.8%-14 d feed	6/10	280 (11%) (red. 89%)	2/10	100 (13%) (red. 87%)
4) 0.4%-14 d water	4/10	125 (5%) (red. 95%)	0/10	(0%) (compl. elimination)
5) 1.2% - 7 d feed	8/10	362 (15%) (red. 85%)	4/10	100 (13%) (red. 87%)

Prevention of Salmonella proliferation
(trial di August 2010)
Challenging at 12 days with $10^{3/ml}$ cfu
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2) 0.4%-14 d feed	8/10	412 (17%) (red. 83%)	4/10	150 (19%) (red. 81%)

Group 2 : 0.4% in the feed for 14 days.

Even if we had only for two days the contemporaneous presence of product and Salmonella (at day 12 challenge, and at day 14 stop of treatment) the product secured a **good control** of Salmonella proliferation

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Groups 3 e 4: 0.8% in the feed or 0.4% in the water for 14 days)

Even if we had only for two days the contemporaneous presence of the product and Salmonella (at day 12 challenge, and at day 14 stop of treatment) the product secured an **excellent control** of Salmonella proliferation

Prevention of Salmonella proliferation
(trial di August 2010)
Challenging at 12 days with $10^{3/ml}$ cfu
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Groups 2 e 5: 0.4% in the feed for 14 days and 1.2% in the feed for only **7 days of treatment : in these groups we achieved similar results**

Non contemporaneous presence of Salmonella and Monobutyrin

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5) 1.2% - 7 d feed	8/10	362 (15%) (red. 85%)	4/10	100 (13%) (red. 87%)

Group 5 :1.2% in the feed for only 7 days;

Even in the absence of contemporaneity with the infection, (Monobutyrin administration until day 7, and challenge at day 12 , i.e. 5 days later) Monobutyrin performed a **"protection"** from Salmonella **in the birds**.

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4) 0.4%-14 d feed	4/10	125 (5%) (red. 95%)	0/10	(0%) (compl. elimination)

In order to better clarify the efficacy of monobutyrin against Salmonella we decided to treat groups 2 e 3 as follows: group 2 with 0.4% monobutyrin in water from day 40 through day 43, Group 3 with 0.2% monobutyrin in water from day 40 through day 43

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Prevention and intervention post infection of Salmonella (trial August 2010)
Challenging at day 12 with 10^3 cfu/ml
31 days post infection (43 days of life) the results were

Group	Positive caeca	Cfu/caeca Intensity	Positive livers	Cfu/livers Intensity
1) Control	9/10	1806 (100%)	8/10	550 (100%)
2) 0.4% -14 d feed +0.4% water 4 days	1/10	200 (11%) (red. 89%)	0/10	(0%) (complete elimination)
3) 0.8% -14 d feed +0.2% water 4 days	2/10	350 (19%) (red. 81%)	0/10	(0%) (complete elimination)
4) 0.4% -14 d water	3/10	167 (9%) (red. 91%)	0/10	(0%) (complete elimination)
5) 1.2% -7 d feed	6/10	367 (20%) (red. 80%)	2/10	100 (18%) (red. 82%)

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Post infection intervention of Salmonella

Groups 2 e 3 took undoubtedly advantage of the use "post infection" of monobutyrin with the complete negative counts of livers and the almost complete negative counts of caeca.

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Post infection intervention of Salmonella

A highly significant result, is we consider that we are not talking about an antibiotic and considering also the limited duration of the intervention (4 days).

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Post infection intervention of Salmonella

A similar result was already achieved with the trial of April 2010 (2nd salmonella trial), when the control group, resulting with 100% positive counts was treated starting from day 25 of life (15 days post infection with 10^3/ml Salmonella Typhimurium) with 1% in water for 5 days.

At day 30, 80% negative counts and 20% positive counts only were recorded.

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Speeding the development and maturation of the gut

The efficacy of glycerides of butyric acid upon the gut development is well-known since a long time and has been confirmed by prof. Steve Leeson and prof. Mauro Antongiovanni, among the others.

Several times I have been asked: why, if this function is a well-known one, it is not easy to demonstrate it in experimental trials carried out on the poultry industry farms?

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Speeding the development and maturation of the gut

The answer almost surely may be found in the setting out of the experimental trials because:

- The speeding of gut maturation leads to a stronger resistance following challenges such as Clostridium, Coccidyosis, Disbacteriosis, etc.
- Usually the trials are carried out in experimental premises where the control group (negative or positive) is not effectively challenged; the consequence can be that the positive effect of Monobutyrin is not so visible.

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Speeding the development and maturation of the gut

In the Forlì 2nd Salmonella trial the live weights of the birds was measured as well; the body weights (in grams) at day 22 and day 33 were:

Age	Gr1 control	Gr2	Gr3	Gr4	Gr5
Day 22	776.4 (100%)	876.9 (112.9%)	871.8 (112.3%)	917.5 (118.2%)	935.7 (120.5%)
Day 33	1494.2 (100%)	1672.4 (111.9%)	1673.0 (112.0%)	1760.2 (117.8%)	1759.9 (117.8%)

In the presence of a sure challenge (in this case Salmonella Typhimurium) the birds receiving monobutyrin grew evidently faster.

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How to use monobutyrin in the poultry industry

The directions about how and when to use monobutyrin in poultry feed must pass through the answer to the following two questions:

1. when is it extremely important to ensure the speeding up of the gut maturation?
2. when is it more likely that a "bacterial" challenge may occur?

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Maturation of the gut

Everybody agrees in thinking that the first two / three weeks of life of broilers are fundamental to the gut development.

Everybody agrees in thinking that the first three / four weeks of life of turkeys are fundamental to the gut development.

Everybody agrees in thinking that the first two / three weeks of life of pullets and breeders are fundamental to the gut development.

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Bacterial challenge

Everybody agrees in thinking that the first two / three weeks of life of broilers are crucial for the bacterial challenge.

Everybody agrees in thinking that the first two / three weeks of life of turkeys are crucial for the bacterial challenge.

Everybody agrees in thinking that the first two / three weeks of life of pullets and breeders are crucial for the bacterial challenge.

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Correct "timing" of administration of monobutyrin

On the basis of what has been said so far it is evident that the use of monobutyrin results absolutely advisable from the very first day of life, for the first three / four weeks of life.

This also to ensure the contemporaneity of the use of monobutyrin and the bacterial challenge.

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Practical indications for the use of monobutyrin

Due to the long lasting use of the product, the most advisable choice is using the liquid Monobutyrin in the feed.

The product "as such" is liquid and water soluble, hence, it can be added to the drinking water, but the long lasting treatment, left in the hands of farmers does not convince me a great deal.

Concerning the product adsorbed on silica, it is easy mixable with the feed.

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Recommended amounts of Monobutyrin

As far as the recommended dose of monobutyrin is concerned, it is necessary to analyse the history of the bacterial challenge present in each farm and the deep aim of the use of monobutyrin.

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Recommended amounts of Monobutyrin

If the amount recommended for the gut maturation and for a mild bacterial challenge is 3.0 kg/ton feed, we recommend to increase the dosage up to 4 kg/ton and even up to 5 kg/ton mixed feed, in particular if a heavy challenge is suspected or if a prevention of Salmonella proliferation is desired.

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Recommended amounts of Monobutyrin

In the presence of Salmonella within a group of birds, it is advisable the use of monobutyrin in the drinking water.

The recommended dosage is at least 4-5 kg/ton water and the treatment must last for at least 4-5 days.

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Presence/absence of Salmonella in the faeces following the use of monobutyrin

Group	22 days	33 days	43 days
1	+	+	+
2	+	+	-
3	+	-	-
4	-	-	-
5	+	+	+

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Un grazie di cuore a tutti

Dr Bruno Tempesta
(Nutrizionista)
bruno.tempesta@gmail.com

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