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# Los Avicultores y su entorno

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## Eliminación de Animales Muertos
Ante Desastres.

## Poblaciones de Virus Velogénicos de NC
Circulantes en México.

# Embriodiagnóstico
## Desarrollo Embrionario Su Fracaso en la Incubación.

# Evaluation of the Effect of **Viusid Vet Liquid** on **Productive Parameters** of Broilers and Its Immunomodulatory Action at a Commercial Poultry Farm

## *Background*

Intensive broiler production nowadays not only means that the work involved in feeding, handling, biosafety, and preventive medicine must be extremely efficient, but also the birds have to be kept healthy for as long as possible. Looking after these poultry populations and making sure that the maximum standards of health are upheld is a huge challenge. That is why growth enhancers and products that improve and preserve the birds' overall general immune response (immunomodulators) are essential.

In this sense, with Viusid Vet Liquid, a commercial product from Catalysis, distributed by Laboratorio Dermaceutical México, S.A. de C.V., the immune system of broilers and their productive expression can indeed be optimized. Viusid Vet Liquid is a food supplement made of antioxidants, vitamins, trace elements, and an active substance from liquorice root extract (glycyrrhizinic acid) with powerful antiviral properties.

The molecular activation of its active substances stimulates their biological functions (antiviral and antioxidant action), without modifying their molecular structure, which significantly builds up the organism's defences.

## *Objective*

To evaluate the effect of Viusid Vet Liquid on the productive parameters and also how it acts as an immunomodulator in broilers up to 35 days of the fattening period when it is added to their drinking water.

## *Hypothesis*

To increase the humoral immune response when Viusid Vet Liquid is added to the drinking water and to improve the productive parameters of broilers.

## *Material and Methods*

**SPECIES:** Ross x Ross strain of broiler, one day old, mixed gender, and housed in four sheds:

62,050 birds treated with Viusid Vet Liquid: 31,025 mixed gender (21,809 males and 9,216 females) in shed 1 and 31,025 mixed gender (21,809 males and 9,216 females) in shed 2; and 62,076 birds in the control group: 31,040 mixed gender (22,116 males and 8,924 females) in shed 3 and 31,036 mixed gender (22,320 males and 8,716 females) in shed 4; 124,126 birds in total.

**PLACE:** Commercial poultry farm "Morita", located in Queretaro, Mexico, where the birds are reared in semi-controlled conditions in sheds that are fitted out with an automatic feeder and cupless nipple drinkers. 124,126 birds were used in total.

**PRODUCT:** Viusid Vet Liquid, a commercial product from Catalysis, Spain, distributed by Laboratorio Dermaceutical México, S.A. de C.V., packed in 1 litre containers and to be added to the drinking water. Dose of 1 litre/1000 L of drinking water.

**FEED:** Pre-starter 0-7 days (grain), starter 8-21 days (pellet), grower 22-28 days (pellet), and finisher 29-35 days (pellet) at the end of the fattening period.

**EVALUATION TIME:** from one day up to 35 days old.

**SHEDS 1 AND 2:** The broilers were treated with Viusid Vet Liquid in the ratio of 1 litre/1000 litres of drinking water continuously throughout the fattening period.

**SHEDS 3 AND 4:** The broilers were used as control group.

All the birds were given water and feed ad-libitum and they were vaccinated in accordance with the established vaccination calendars at the farm.

- ***Experimental design***

o Farm "Morita"
o Number of birds in the clinical trial: 124,126
o Control group birds: 62,076
o Treatment group birds: 62,050

- ***Parameters evaluated at 35 days***
  - o % of mortality
  - o Weekly weight
  - o Cumulative weekly feed conversion

- ***Serological and histopathological tests***
  - o Haemagglutination-inhibition test for Newcastle disease (HI-ND) at 21 and 35 days old
  - o Histopathological tests on lymphoid organs (spleen, bursa of Fabricius, and thymus) at 21 and 35 days old.

20 samples of serum (20 s.) and 10 lymphoid organs (10 o.) were taken from birds of each group for the tests.

The following monitoring programme (Table 1) was set up for the two groups, the control group and the treatment group given Viusid Vet Liquid:

## Averages

The average weight per bird (Table 2) in the group treated with Viusid Vet Liquid increased by more than 77 g (1%), which is quite considerable compared to that of the birds in the control group.

The average cumulative and weekly mortality (Table 3) was lower for the group treated with Viusid Vet Liquid throughout the trial. It dropped by 26%, 1.3 real points more than that of the control group.

The final average feed conversion (Table 4) was 6% less, which is equivalent to 95 g of feed per kilo of weight, for the group treated with Viusid Vet Liquid. This is quite significant too.

Tables 5, 6, and 7 show some comparative indicators of the sheds 1 vs 3.

**Table 1.**

| Days old | Laboratory tests | Group |
|---|---|---|
| 21 days | HI-ND (20 serum samples) | Haemagglutination-inhibition test for Newcastle disease |
| 21 days | Histopathological test T,BF,S,L (10 organs) | T: thymus, BF: bursa of Fabricius, S: spleen, L: liver. |
| 35 days | HI-ND (20 serum samples) | Haemagglutination-inhibition test for Newcastle disease |
| 35 days | Histopathological test T,BF,S,L (10 organs) | T: thymus, BF: bursa of Fabricius, S: spleen, L: liver. |

**Table 2.**

| Week | VIUSID Weight | Control Weight | |
|---|---|---|---|
| 1 | 0.1480 | 0.1495 | -1% |
| 2 | 0.3285 | 0.3265 | 1% |
| 3 | 0.7415 | 0.7575 | -2% |
| 4 | 1.131 | 1.100 | 3% |
| 5 | 1.603 | 1.580 | 1% |

**Table 3.**

| VIUSID %C. Mort. | Control %C. Mort. | |
|---|---|---|
| 0.53% | 0.55% | -5% |
| 1.43% | 1.65% | -13% |
| 2.27% | 3.48% | -35% |
| 3.08% | 4.44% | -31% |
| 3.72% | 5.02% | -26% |

**Table 4.**

| VIUSID C. Conv. | Control C. Conv. | |
|---|---|---|
| 1.9650 | 1.9000 | 3% |
| 1.6100 | 1.6300 | -1% |
| 1.3900 | 1.3500 | 3% |
| 1.475 | 1.535 | -4% |
| 1.560 | 1.655 | -6% |

## Results

Productive parameters recorded at Morita farm for the broilers that are continuously treated with Viusid Vet Liquid in a ratio of 1 litre/1000 litres of drinking water, until they were 35 days old. Data on weight, mortality, and feed conversion are shown in the tables 2, 3, and 4.

The average weight per bird (Table 5) in the group treated with Viusid Vet Liquid was 13 g (1%) less than that of the control group.

The average cumulative and weekly mortality (Table 6) was always lower for the group treated with Viusid Vet Liquid and by the end of the trial, in the 5th week, it was 40% (2.71 real points) lower than that of the birds in the

**Table 5.**

| Week | VIUSID Shed 1. Weight | Control Shed 3. Weight | |
|---|---|---|---|
| 1 | 0.144 | 0.149 | -3% |
| 2 | 0.317 | 0.325 | 2% |
| 3 | 0.736 | 0.755 | -3% |
| 4 | 1.125 | 1.120 | 0% |
| 5 | 1.570 | 1.583 | -1% |

**Table 6.**

| VIUSID Shed 1. %C. Mort. | Control Shed 3. %C. Mort. | |
|---|---|---|
| 0.52% | 0.60% | -13% |
| 1.46% | 1.92% | -24% |
| 2.33% | 4.77% | -51% |
| 3.31% | 5.98% | -45% |
| 4.00% | 6.71% | -40% |

**Table 7.**

| VIUSID Shed 1. C. Conv. | Control Shed 3. C. Conv. | |
|---|---|---|
| 2.100 | 1.880 | 12% |
| 1.700 | 1.650 | 3% |
| 1.410 | 1.350 | 4% |
| 1.490 | 1.510 | -1% |
| 1.600 | 1.660 | -4% |

**Table 8.**

| Week | VIUSID Shed 2. Weight | Control Shed 4. Weight | |
|---|---|---|---|
| 1 | 0.152 | 0.150 | 1% |
| 2 | 0.340 | 0.328 | 4% |
| 3 | 0.747 | 0.760 | -2% |
| 4 | 1.136 | 1.079 | 5% |
| 5 | 1.635 | 1.577 | 4% |

**Table 9.**

| VIUSID Shed 2. %C. Mort. | Control Shed 4. %C. Mort. | |
|---|---|---|
| 0.53% | 0.50% | 6% |
| 1.40% | 1.38% | 1% |
| 2.21% | 2.19% | 1% |
| 2.85% | 2.89% | -1% |
| 3.43% | 3.32% | 3% |

**Table 10.**

| VIUSID Shed 2. C. Conv. | Control Shed 4. C. Conv. | |
|---|---|---|
| 1.830 | 1.920 | -5% |
| 1.520 | 1.610 | -6% |
| 1.370 | 1.350 | 1% |
| 1.460 | 1.560 | -6% |
| 1.520 | 1.650 | -8% |

control group, which is quite considerable in statistical terms ($P<0.05$).

The final average feed conversion (Table 7) was 4% less, which is equivalent to 60 g of feed per kilo of weight, for the group treated with Viusid Vet Liquid.

And tables 8, 9, and 10 show the same comparative indicators of the sheds 2 vs 4.

The average weight per bird (Table 8) in the group treated with Viusid Vet Liquid was 4% (58 g) more than that of the birds from the control group.

The average weekly mortality rate (Table 9) was the same until the 4th week and then, by the end of the trial, it slightly increased in the control group, namely 0.11% more than that of the birds being treated with Viusid Vet Liquid.

The average weekly and cumulative feed conversion (Table 10) was always better for the birds that were administered Viusid Vet Liquid. By the end of the trial, it was 8% more than that of the control group, which is equivalent to 130 g of feed per kilo of weight, and this is quite considerable in statistical terms ($P<0.05$).

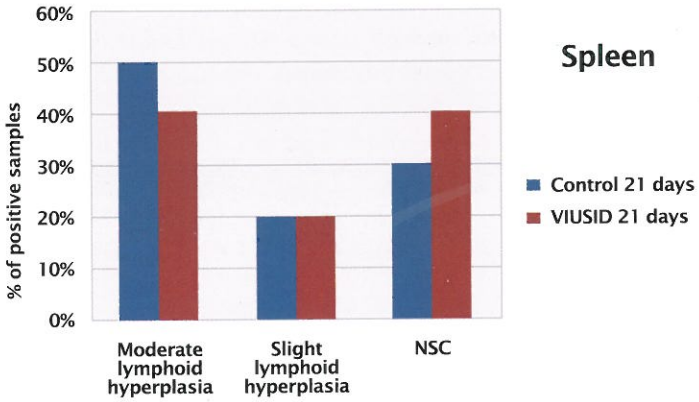
## *Graphs of histopathological results*

The histopathological results of the spleen were as shown in table 11 and graphs 1 and 2.

In short, the histological tests on the spleen showed that the lymphoid tissue development was similar in both groups at 21 and 35 days, although Viusid Vet Liquid proved to be more effective (60%) in reducing the damage in the birds from the treatment group when they were 35 days old.

As for the histopathological results of the liver, they are shown in table 12 and graph 3.

**Graph 1.**




***N.B.:*** In the histological tests, lymphoid tissue development was detected in the spleen of the birds from the control group (10%), whilst Viusid Vet Liquid was seen to provide more effective protection against damage (40%).

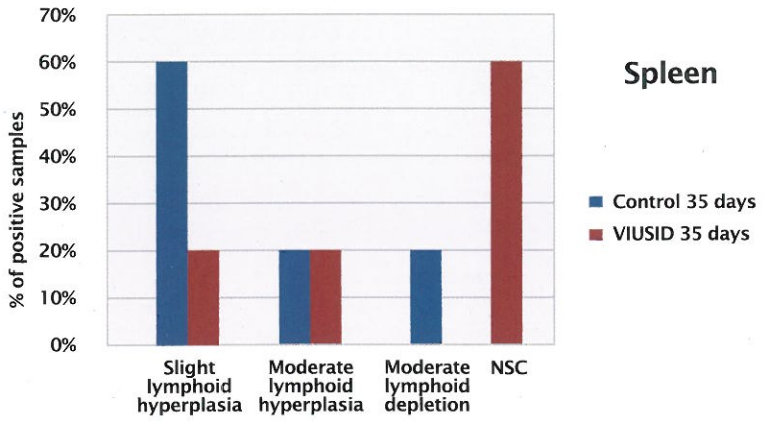
**Table 11.**

| | | Control group 21 days | Viusid Vet Liquid 21 days | Control group 35 days | Viusid Vet Liquid 35 days |
|---|---|---|---|---|---|
| Spleen | Moderate lymphoid hyperplasia | 50% | 40% | 20% | 20% |
| | Slight lymphoid hyperplasia | 20% | 20% | 60% | 20% |
| | No siginficant changes | 30% | 40% | 0% | 60% |
| | Moderate lymphoid depletion | | | 20% | 0% |

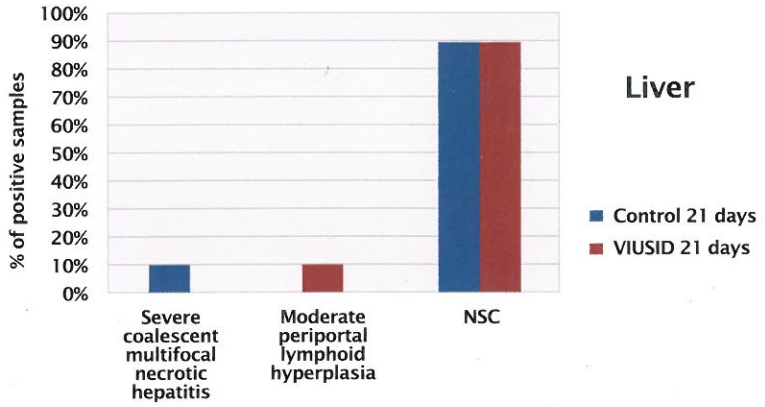
**Table 12.**

| | | Control group 21 days | Viusid Vet Liquid 21 days |
|---|---|---|---|
| Liver | Severe coalescent multifocal necrotic hepatitis | 10% | 0% |
| | Moderate periportal lymphoid hyperplasia | 0% | 10% |
| | No siginficant changes | 90% | 90% |

## Graph 2.



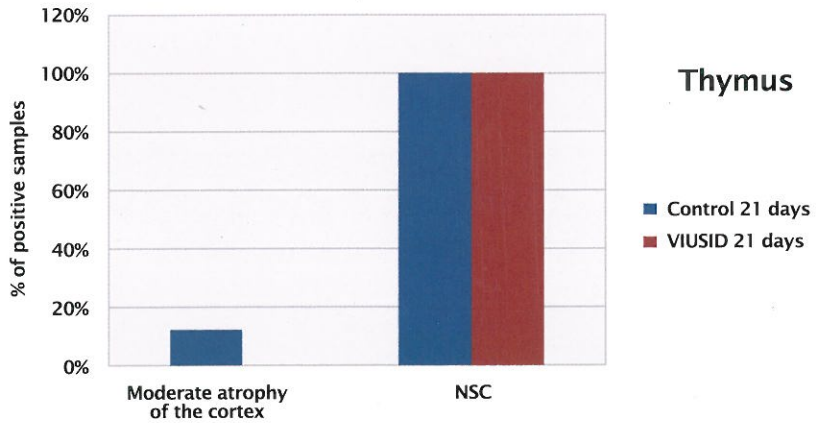

## Graph 3.




***N.B.:*** There was a 10% increase in lymphoid tissue in the birds from the group treated with Viusid Vet Liquid, but no hepatic necrosis was detected. In contrast, necrotic lesions were observed in 10% of the tissue of the birds from the control group.

****At 35 days, there were no significant changes.

## Graph 4.




***N.B.:*** Graph 4 shows that the thymus of the birds treated with Viusid Vet Liquid was not altered in any way (lesions) compared to that of the birds in the control group, where atrophic lesions were observed in 10% of the tissue.

As for the histopathological results of the liver, they are shown in table 12 and graph 3.

Table 13 and graphs 4 and 5 show the histopathological results of the thymus.

In short, 100% of the lesions in the thymus of the birds treated with Viusid Vet Liquid recovered (apoptosis) from a foreign-agent challenge whilst the birds from the control group had atrophic lesions in 20% of the tissue.

As for the histopathological results of the bursa of Fabricius, they are shown in table 14 and graphs 6 and 7.

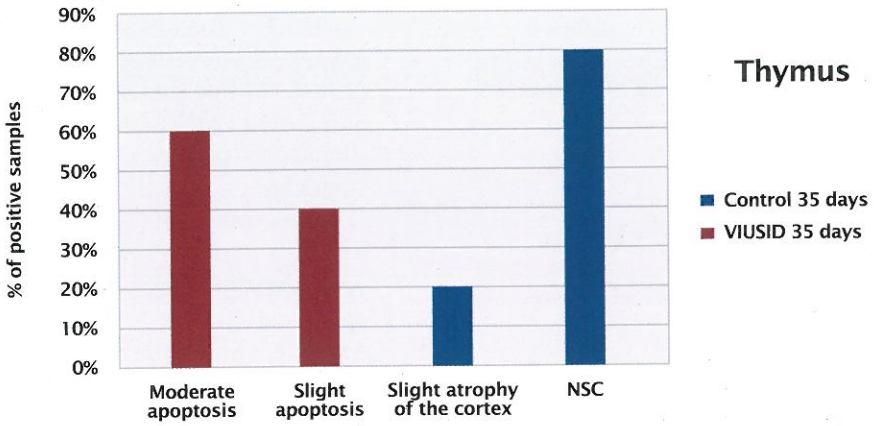
In graph 6, heterophilic cells were seen to enhance the development of the bursal tissue in 25% of the birds treated with Viusid Vet Liquid and in 0% of the birds from the control group at 21 days old.

And in graph 7, at 35 days, there were severe and chronic lesions in 60% and cicatrization in 40% of the control group, in contrast to the group treated with Viusid Vet Liquid, that only had subacute and moderate lesions (100%).

The conclusion made is that the heterophilic cells enhanced the development of the bursal tissue in 25% of the birds from the group treated with Viusid Vet Liquid compared to only 8% of the birds from the control group when they were 21 days old. At 35 days, there were 60% of severe and chronic lesions and 40% of cicatrization in the birds from the control group.

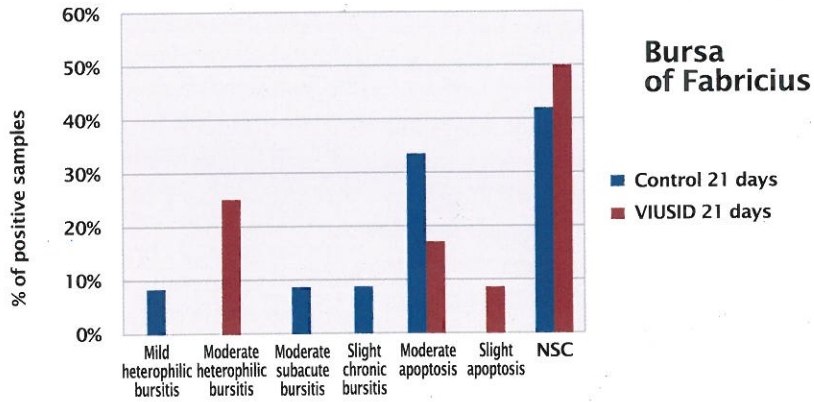
The birds from the group treated with Viusid Vet Liquid had subacute and moderate lesions (100%).

## Graph 5.

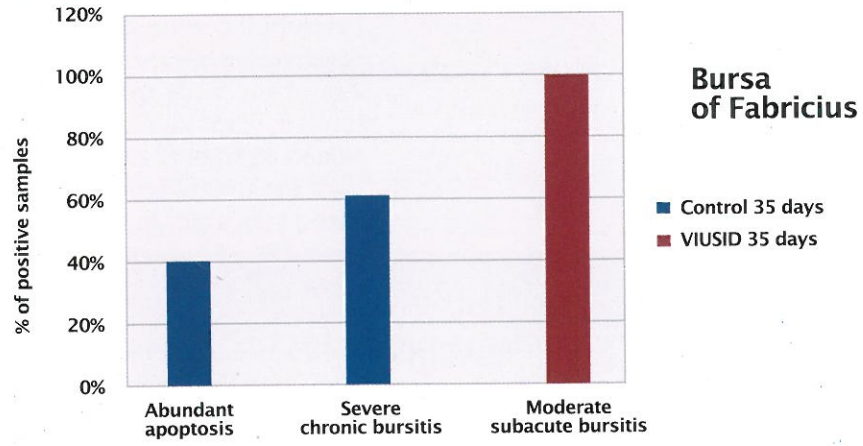



*N.B.:* At 35 days, there were healing lesions in the thymus of 100% of the birds treated with Viusid Vet Liquid. In the control group, there was slight atrophy in 20% of the tissue.

## Graph 6.




## Graph 7.




## Graphs of serological results

The values are obtained from the dilutions in the haemagglutination-inhibition test for Newcastle disease (HI-ND) when the birds are 21 and 35 days old (table 15 and graphs 8, 9, and 10).

The concentration of antibody titres against Newcastle disease was higher in the group treated with Viusid Vet Liquid ($P<0.05$) than in the control group, which means that the birds treated with Viusid Vet Liquid produced 0.65 log 2 more antibodies than the birds in the control group when they were 21 days old (graph 8).

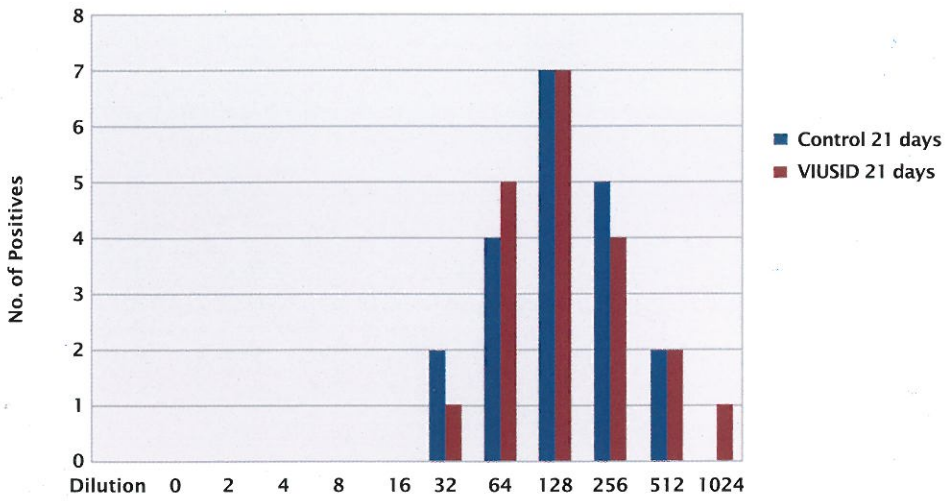
The initial trend observed in the monitoring programme when the birds from the group treated with Viusid Vet Liquid were 21 days old remained the same until they were 35 days old (graph 10).

The highest concentration of antibodies was 0.15 log 2 for the group treated with Viusid Vet Liquid (graph 9).

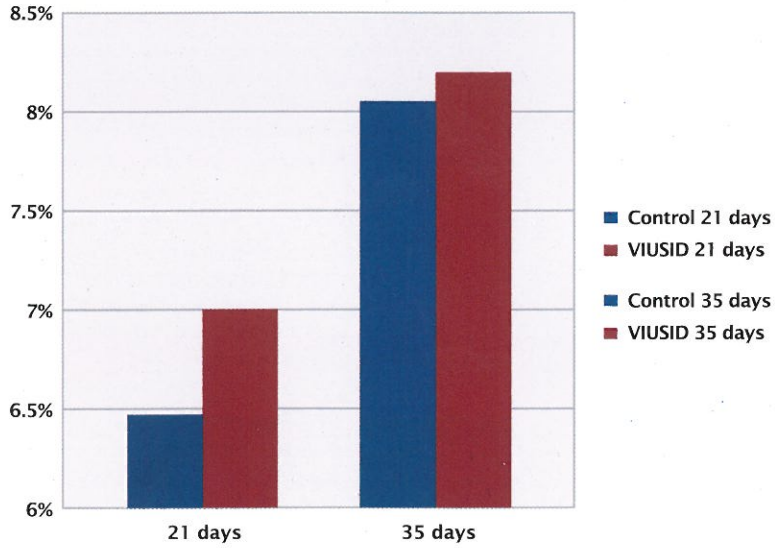
## Table 13.

| | | Control group 21 days | Viusid Vet Liquid 21 days | Control group 35 days | Viusid Vet Liquid 35 days |
|---|---|---|---|---|---|
| Thymus | Moderate atrophy of the cortex | 10% | 0% | | |
| | Moderate apoptosis | | | 0% | 60% |
| | Slight apoptosis | | | 0% | 40% |
| | Slight atrophy of the cortex | | | 20% | 0% |
| | No significant changes | 90% | 100% | 80% | 0% |

## Graph 8.




## Graph 9.




## Conclusions

1 Viusid Vet Liquid proved to have an immunomodulatory effect on the lymphoid organs and tissue of the birds up to 35 days old, generating a positive impact on their overall health and a favourable repercussion on productive parameters.

2 The birds treated with Viusid Vet Liquid for 35 days developed better and more uniform antibody titres against Newcastle disease (HI-ND) than the birds from the control group.

3 On the histopathological level, Viusid Vet Liquid had favourable effects on lymphoid cells and also favoured minimal lesions or the absence of lesions in the primary lymphoid tissues, namely, spleen, bursa of Fabricius, and thymus.

Adding Viusid Vet Liquid to the birds' drinking water does not alter their homeostasis or cause symptomatology in any way after the product has been used. It does, however, improve the productive expression in strains of high-yield broilers.

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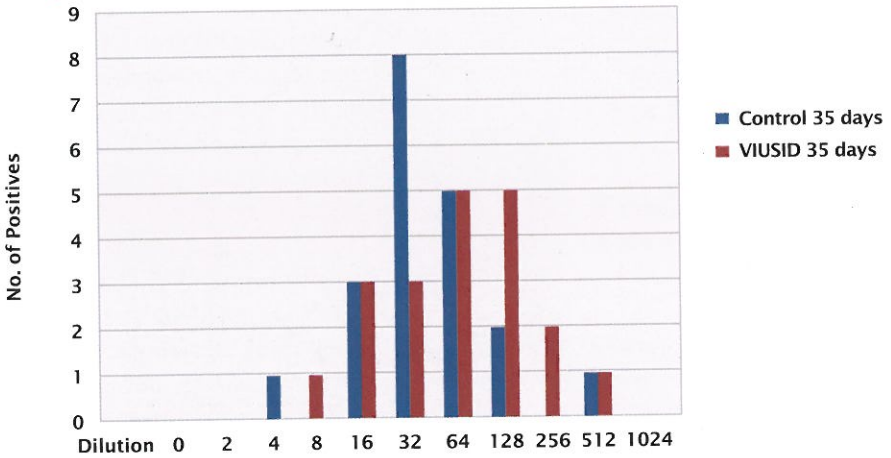
## Table 14.

| | | Control group 21 days | Viusid Vet Liquid 21 days | Control group 35 days | Viusid Vet Liquid 35 days |
|---|---|---|---|---|---|
| Bursa of Fabricius | Mild heterophilic bursitis | 8% | | | |
| | Moderate heterophilic bursitis* | | 25% | | |
| | Moderate subacute bursitis | 8% | | | 100% |
| | Slight chronic bursitis | 8% | | | |
| | Severe chronic bursitis | | | 60% | |
| | Moderate apoptosis | 33% | 17% | | |
| | Slight apoptosis | | 8% | | |
| | Abundant apoptosis | | | 40% | |
| | No significant changes | 42% | 50% | | |

## Table 15.

| | Dilution | Control 21 days | Viusid Vet Liquid 21 days | Control 35 days | Viusid Vet Liquid 35 days |
|---|---|---|---|---|---|
| HI-ND | 4 | 0 | 0 | 0 | 0 |
| | 8 | 0 | 0 | 1 | 0 |
| | 16 | 0 | 0 | 0 | 1 |
| | 32 | 0 | 0 | 3 | 3 |
| | 64 | 2 | 1 | 8 | 3 |
| | 128 | 4 | 5 | 5 | 5 |
| | 256 | 7 | 7 | 2 | 5 |
| | 512 | 5 | 4 | 0 | 2 |
| | 1024 | 2 | 2 | 1 | 1 |
| | 2048 | 0 | 1 | 0 | 0 |

## Graph 10.





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