



# MEZINÁRODNÍ TESTOVÁNÍ DRŮBEŽE ÚSTRAŠICE

státní podnik

390 02 Tábor 2

Česká republika

XXXXXX

XXXXXX (No. 1225)

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XXXXXX (VT č. 1225)

**International Poultry Testing Station Ústrašice**  
**Mezinárodní testování drůbeže Ústrašice**

**Czech Republic**  
**Česká republika**

**Study Investigator:**  
Zpracovatel studie:

Ing. Jan Tyl

**Associate Investigator:**  
Spoluzpracovatel studie:

Ing. Hana Horná  
Ing. Hana Koželuhová  
Ing. Markéta Krekulová

**Study monitor:**  
Dohlížel:

XXXXXX

**Study sponsor :**  
Dohlížel:

XXXXXX

**Dezember 2021**  
Prosinec 2021

## **Aim of the Project**

To evaluate the effects of xxxxxx, on growth performance, intestinal integrity, and health status in broilers fed diets rich in rye, in continuous use or under an intermittent application programme.

## **Study location**

The study was carried out on the test facility Mezinárodní testování drůbeže, s.p., (next MTD, s.p. only), Ústřašice, Czech Republic. Feed samples were sent for the contents of nutrients by xxxxxx.

## **Trial period**

|                                |                 |
|--------------------------------|-----------------|
| Beginning of the trial:        | 3 November 2021 |
| End of the trial:              | 7 Dezember 2021 |
| Finishing of the final report: | Dezember 2021   |

## **Study responsibility**

Ing. Jan Tyl was the independent Study Director, responsible that the trial is conducted according to the protocol. Ing. Hana Horná was responsible for daily animal care at the test facility. Full details of study's responsibility are provided below.

### **Persons involved in the trial**

|                                |                                                               |
|--------------------------------|---------------------------------------------------------------|
| <b>Study Investigator:</b>     | Ing. Jan Tyl                                                  |
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| <br>                           |                                                               |
| <b>Study sponsor:</b>          | xxxxxxx                                                       |
| <b>Address:</b>                | xxxxxxx                                                       |
| <b>Telephone:</b>              | xxxxxxx                                                       |
| <b>E.mail:</b>                 | xxxxxxx                                                       |
| <br>                           |                                                               |
| <b>Study monitor:</b>          | xxxxxxx                                                       |
| <b>Address:</b>                | xxxxxxx                                                       |
| <b>Telephone:</b>              | xxxxxxx                                                       |
| <b>E.mail:</b>                 | xxxxxxx                                                       |
| <br>                           |                                                               |
| <b>Veterinary Surgeon:</b>     | xxxxxxx                                                       |
| <b>Address:</b>                | xxxxxxx                                                       |
| <b>Telephone:</b>              | xxxxxxx                                                       |

## **Material and methods**

### **Birds**

In total there were 7800 day old chicks (males) of xxxxxx. Day-old chicks were randomly distributed into 6 dietary treatments with 10 replicates per treatment and 130 chicken per replicate.

Origin 1-day old chicks:

breeder company – xxxxxx

parent flock – xxxxxx

age of the breeding flock - 52 weeks

### **Experimental treatments:**

| <b>Tr. No</b> | <b>Tr.</b> | <b>Description</b> | <b>No. of pen</b> | <b>No. of chick</b> |
|---------------|------------|--------------------|-------------------|---------------------|
| 1             | T1         | xxxxxxx            | 10                | 1300                |
| 2             | T2         | xxxxxxx            | 10                | 1300                |
| 3             | T3         | xxxxxxx            | 10                | 1300                |
| 4             | T4         | xxxxxxx            | 10                | 1300                |
| 5             | T5         | xxxxxxx            | 10                | 1300                |
| 6             | T6         | xxxxxxx            | 10                | 1300                |

The continuous application (T2 and T5) consisted of 1 xxxxxx tablet/1000 l of water on daily basis

The intermittent application (T3 and T6) consisted of 1 xxxxxx tablet/1000 l of water following the below schedule:

- Day 1 - 4
- Day 9 - 12
- Day 23 – 26
- Day 32 – 35

### **Housing system**

Chickens were kept in the windowless chicken house with full climatic control, on deep litter. The heating program was conducted according to the Manual of xxxxxx. Drinking water was

supplied ad libitum by nipple drinkers. Each pen was equipped with manually filled tube feeders. Bedding material was wood shaving.

Light was provided as follows during the experimental period:

|                            |                              |                                         |
|----------------------------|------------------------------|-----------------------------------------|
| <u>Lighting programme:</u> | Day 1 - 7                    | 23 hours of light + 1 hour of darkness  |
|                            | Day 8 - 32                   | 18 hours of light + 6 hours of darkness |
|                            | Day 33 - 35                  | 23 hours of light + 1 hour of darkness  |
| <u>Stocking density:</u>   | 16 broilers per square meter |                                         |

The conduct of the trial was conformed to the national welfare legislation.

### **Veterinary precautions**

The chicken house was disinfected with xxxxxx before the chick placement.

On day 1 the chicken were vaccinated with xxxxxx (the spray in the eyes). On the first days old chickens was applied the water solution of permanganate.

### **Feeds and Diets**

Chickens were fed ad libitum according to three phase feeding programme. The test phases were 0-10 days of age for the starter BR1, 11-24 days of age for the grower BR2 and 25-35 days of age for the finisher BR3.

Feed was produced by International Poultry Testing Station Ústřašice. The composition of diets is shown in following tables.

## Composition of the feed

| Ingredients (%)                    | Control diets |        |          | Diets with rye |        |          |
|------------------------------------|---------------|--------|----------|----------------|--------|----------|
|                                    | Starter       | Grower | Finisher | Starter        | Grower | Finisher |
| Corn                               | 36.19         | 44.31  | 50.00    | 34.52          | 40.77  | 34.77    |
| Soyabean meal                      | 35.48         | 27.85  | 22.77    | 36.19          | 29.38  | 24.46    |
| Wheat                              | 20.00         | 20.00  | 20.00    | 10.00          | -      | -        |
| Rye                                | -             | -      | -        | 10.00          | 20.00  | 30.00    |
| Soyabean oil                       | 3.40          | 3.40   | 2.89     | 4.45           | 5.55   | 6.42     |
| Limestone                          | 1.71          | 1.43   | 1.35     | 1.74           | 1.48   | 1.42     |
| Monocalciumphosphate               | 1.07          | 0.98   | 0.92     | 1.07           | 0.95   | 0.89     |
| Salt                               | 0.30          | 0.30   | 0.30     | 0.30           | 0.31   | 0.31     |
| Sodium bicarbonate                 | 0.11          | 0.12   | 0.12     | 0.10           | 0.10   | 0.10     |
| AMV BR1 plus                       | 0.50          | -      | -        | 0.50           | -      | -        |
| AMV BR2 plus                       | -             | 0.50   | -        | -              | 0.50   | -        |
| AMV BR3 plus                       | -             | -      | 0.50     | -              | -      | 0.50     |
| xxxxxxx                            | 1.24          | 1.11   | 1.15     | 1.13           | 0.96   | 1.13     |
| <b>Nutritional composition (%)</b> |               |        |          |                |        |          |
| crude protein                      | 22.60         | 19.60  | 17.70    | 22.50          | 19.50  | 17.70    |
| ME (MJ/kg)                         | 12.65         | 13.00  | 13.10    | 12.65          | 13.00  | 13.10    |
| Ca                                 | 1.05          | 0.90   | 0.85     | 1.05           | 0.90   | 0.85     |
| P available                        | 0.50          | 0.45   | 0.42     | 0.50           | 0.45   | 0.42     |
| Na                                 | 0.16          | 0.16   | 0.16     | 0.16           | 0.16   | 0.16     |
| Cl                                 | 0.23          | 0.23   | 0.23     | 0.23           | 0.23   | 0.23     |
| Lys (dig.)                         | 1.27          | 1.09   | 1.00     | 1.27           | 1.09   | 1.00     |
| Met (dig.)                         | 0.60          | 0.52   | 0.49     | 0.60           | 0.53   | 0.50     |
| M+C (dig.)                         | 0.92          | 0.81   | 0.76     | 0.92           | 0.81   | 0.76     |
| Threonin (dig.)                    | 0.80          | 0.70   | 0.65     | 0.80           | 0.70   | 0.65     |
| Thryptophan (dig.)                 | 0.23          | 0.20   | 0.17     | 0.23           | 0.20   | 0.17     |
| Val (dig.)                         | 1.00          | 0.87   | 0.80     | 1.00           | 0.87   | 0.80     |
| Ile (dig.)                         | 0.86          | 0.75   | 0.71     | 0.86           | 0.75   | 0.71     |
| Arg (dig.)                         | 1.30          | 1.13   | 1.05     | 1.30           | 1.13   | 1.05     |

## **Parameters recorded and methods applied**

### **Live weight**

Live weight was measured on day 1 and on day 10 (all the birds in each pen were weighed altogether). On day 24 of age birds were weighed individually, without fasting. On day 35 birds were weighed individually, after 12 hours of fasting.

### **Feed consumption**

Feed consumption was determined per pen for the feed – starter, grower and finisher.

### **Weight gain**

Weight gain per phase and average daily weight gains were calculated for the periods 1 – 10 days, 11 – 24 days, 25 – 35 days and for the overall experiment (1 – 35 days).

### **Feed conversion ratio**

Feed conversion ratio was calculated as feed consumption per 1 kg of live weight and per 1 kg of weight gain for the periods 1 – 10 days, 11 – 24 days, 25 – 35 days and for the overall experiment (1 – 35 days). The calculation was included weight of deaths.

### **Mortality**

All pens were checked three times a day to see if there were any dead or ill birds. Dead chickens were registered by date, weight and reason of mortality on the day of death. Mortality was recorded for the periods 1 – 10 days, 11 – 24 days, 25 – 35 days and 1 – 35 days.

### **Foot pad lesions**

One third of the animals were recorded at the end of the feeding trial according the scale.

### **Statistical analyses**

Performance results of Live weight (on days 1, 10, 24 and 35) and Feed conversion ratio were statistically evaluated using the ANOVA single-factor model (Duncan test, Scheffe test).

## **Results**

|          |                                                                                                                                           |
|----------|-------------------------------------------------------------------------------------------------------------------------------------------|
| Tab. No. | <b>1 Hatchability</b>                                                                                                                     |
|          | <b>2 Performance results:</b>                                                                                                             |
|          | <b>2a Body weight</b>                                                                                                                     |
|          | <b>2b Weight gain</b>                                                                                                                     |
|          | <b>2c Feed conversion per 1 kg of live weight</b>                                                                                         |
|          | <b>2d Feed conversion per 1 kg of weight gain</b>                                                                                         |
|          | <b>2e Feed consumption</b>                                                                                                                |
|          | <b>3 Mortality</b>                                                                                                                        |
|          | <b>4 Foot pad lesions</b>                                                                                                                 |
|          | <b>5 Statistical analysis of body weight at the age of 35 days</b><br>(average body weight, standard deviation, coefficient of variation) |
|          | <b>6 -7 Statistical analyses of performance results</b>                                                                                   |
|          | <b>8 Performance results per pen:</b>                                                                                                     |
|          | <b>8a Body weight</b>                                                                                                                     |
|          | <b>8b Weight gain</b>                                                                                                                     |
|          | <b>8c Feed conversion per 1 kg of live weight</b>                                                                                         |
|          | <b>8d Feed conversion per 1 kg of weight gain</b>                                                                                         |
|          | <b>8e Feed consumption</b>                                                                                                                |
|          | <b>8f Foot pad lesions</b>                                                                                                                |

# Results of incubation and hatching

Tab. No. 1

| Treatment | Tr. No. | Fertility | Hatchability |              | Birds housed | Average weight |                |
|-----------|---------|-----------|--------------|--------------|--------------|----------------|----------------|
|           |         |           | Set eggs     | Fertile eggs |              | Hatching eggs  | Day old chicks |
|           |         | %         | %            | %            |              | g              | g              |
| T1        | 1       | 81.70     | 77.80        | 95.20        | 1300         | 69.00          | 40.62          |
| T2        | 2       |           |              |              | 1300         |                | 40.54          |
| T3        | 3       |           |              |              | 1300         |                | 40.54          |
| T4        | 4       |           |              |              | 1300         |                | 40.54          |
| T5        | 5       |           |              |              | 1300         |                | 40.58          |
| T6        | 6       |           |              |              | 1300         |                | 40.54          |

**Body weight per phases****Tab. No. 2a**

| Treatment | Tr. No. | Day 1 |                     | Day 10 |                     | Day 24 |                     | Day 35 |                     |
|-----------|---------|-------|---------------------|--------|---------------------|--------|---------------------|--------|---------------------|
|           |         | Birds | Average body weight | Birds  | Average body weight | Birds  | Average body weight | Birds  | Average body weight |
|           |         |       | g                   |        | g                   |        | g                   |        | g                   |
| T1        | 1       | 1300  | 40.62               | 1300   | 282.92              | 1276   | 1249.18             | 1267   | 2323.75             |
| T2        | 2       | 1300  | 40.54               | 1300   | 280.77              | 1276   | 1264.55             | 1270   | 2372.94             |
| T3        | 3       | 1300  | 40.54               | 1300   | 282.54              | 1274   | 1247.89             | 1259   | 2386.17             |
| T4        | 4       | 1300  | 40.54               | 1300   | 281.49              | 1275   | 1277.53             | 1268   | 2335.30             |
| T5        | 5       | 1300  | 40.58               | 1300   | 280.15              | 1272   | 1240.04             | 1263   | 2303.78             |
| T6        | 6       | 1300  | 40.54               | 1300   | 282.42              | 1274   | 1249.84             | 1265   | 2233.98             |

**Weight gain per phases****Tab. No. 2b**

| Treatment | Tr. No. | Day 1 - 10            |                   | Day 11 - 24           |                   | Day 25 - 35           |                   | Day 1 – 35            |                   |
|-----------|---------|-----------------------|-------------------|-----------------------|-------------------|-----------------------|-------------------|-----------------------|-------------------|
|           |         | Weight gain per phase | Daily weight gain | Weight gain per phase | Daily weight gain | Weight gain per phase | Daily weight gain | Weight gain per phase | Daily weight gain |
|           |         | g                     | g                 | g                     | g                 | g                     | g                 | g                     | g                 |
| T1        | 1       | 242.31                | 24.23             | 966.26                | 69.02             | 1074.56               | 97.69             | 2283.13               | 65.23             |
| T2        | 2       | 240.23                | 24.02             | 983.78                | 70.27             | 1108.38               | 100.76            | 2332.40               | 66.64             |
| T3        | 3       | 242.00                | 24.20             | 965.35                | 68.95             | 1138.28               | 103.48            | 2345.64               | 67.02             |
| T4        | 4       | 240.96                | 24.10             | 996.04                | 71.15             | 1057.77               | 96.16             | 2294.76               | 65.56             |
| T5        | 5       | 239.58                | 23.96             | 959.89                | 68.56             | 1063.75               | 96.70             | 2263.21               | 64.66             |
| T6        | 6       | 241.89                | 24.19             | 967.41                | 69.10             | 984.14                | 89.47             | 2193.44               | 62.67             |

**Feed conversion per 1 kg of live weight****Tab. No. 2c**

| Treatment | Tr. No. | Feed conversion ratio |                  |                  |
|-----------|---------|-----------------------|------------------|------------------|
|           |         | Day 10                | Day 24           | Day 35           |
|           |         | g/kg live weight      | g/kg live weight | g/kg live weight |
| T1        | 1       | 1013.87               | 1277.83          | 1505.99          |
| T2        | 2       | 1025.21               | 1265.85          | 1472.79          |
| T3        | 3       | 997.82                | 1282.11          | 1465.60          |
| T4        | 4       | 1032.41               | 1274.14          | 1504.94          |
| T5        | 5       | 1003.84               | 1297.47          | 1523.58          |
| T6        | 6       | 1030.10               | 1299.82          | 1580.54          |

**Feed conversion per 1 kg of weight gain****Tab. No. 2d**

| Treatment | Tr. No. | Feed conversion ratio |                  |                  |                  |
|-----------|---------|-----------------------|------------------|------------------|------------------|
|           |         | Day 1-10              | Day 11-24        | Day 25-35        | Day 1-35         |
|           |         | g/kg weight gain      | g/kg weight gain | g/kg weight gain | g/kg weight gain |
| T1        | 1       | 1183.81               | 1355.13          | 1777.70          | 1533.09          |
| T2        | 2       | 1198.20               | 1334.51          | 1714.31          | 1498.66          |
| T3        | 3       | 1164.96               | 1365.41          | 1672.93          | 1491.32          |
| T4        | 4       | 1206.10               | 1342.47          | 1790.31          | 1531.81          |
| T5        | 5       | 1173.86               | 1383.37          | 1794.25          | 1551.29          |
| T6        | 6       | 1202.73               | 1378.68          | 1945.64          | 1610.10          |

**Feed consumption per phases**

**Tab. No. 2e**

| Treatment | Tr.<br>No. | Feed consumption |                  |                    |                |
|-----------|------------|------------------|------------------|--------------------|----------------|
|           |            | Starter (d 1-10) | Grower (d 11-24) | Finisher (d 25-35) | Total (d 1-35) |
|           |            | kg               | kg               | kg                 | kg             |
| T1        | 1          | 372.90           | 1702.10          | 2424.10            | 4499.10        |
| T2        | 2          | 374.20           | 1707.30          | 2415.30            | 4496.80        |
| T3        | 3          | 366.50           | 1711.40          | 2399.50            | 4477.40        |
| T4        | 4          | 377.80           | 1738.20          | 2404.60            | 4520.60        |
| T5        | 5          | 365.60           | 1722.20          | 2411.90            | 4499.70        |
| T6        | 6          | 378.20           | 1731.30          | 2427.80            | 4537.30        |

## Mortality

Tab. No. 3

| Treat. | Tr. No. | Mortality in the period |   |             |      |             |       |            |       |      | Mortality according causes |   |   |   |   |   |   |   |   |    |    |    |    |    |    |
|--------|---------|-------------------------|---|-------------|------|-------------|-------|------------|-------|------|----------------------------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|
|        |         | Day 1 - 10              |   | Day 11 - 24 |      | Day 25 - 35 |       | Day 1 - 35 |       |      | 1                          | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|        |         | birds                   | g | birds       | g    | birds       | g     | birds      | g     | %    |                            |   |   |   |   |   |   |   |   |    |    |    |    |    |    |
| T1     | 1       | 0                       | 0 | 4           | 2244 | 9           | 13389 | 13         | 15633 | 1.00 |                            |   |   |   |   |   |   |   |   | 13 |    |    |    |    | 20 |
| T2     | 2       | 0                       | 0 | 4           | 2867 | 6           | 8841  | 10         | 11708 | 0.77 |                            |   |   |   |   |   |   |   |   | 10 |    |    |    |    | 20 |
| T3     | 3       | 0                       | 0 | 6           | 3082 | 15          | 19932 | 21         | 23014 | 1.62 |                            |   |   |   |   |   |   |   | 2 | 19 |    |    |    |    | 20 |
| T4     | 4       | 0                       | 0 | 5           | 3492 | 7           | 10808 | 12         | 14300 | 0.92 |                            |   |   |   |   |   |   |   |   | 12 |    |    |    |    | 20 |
| T5     | 5       | 0                       | 0 | 8           | 4191 | 9           | 11891 | 17         | 16082 | 1.31 |                            |   |   |   |   |   |   |   |   | 17 |    |    |    |    | 20 |
| T6     | 6       | 0                       | 0 | 6           | 3384 | 9           | 14123 | 15         | 17507 | 1.15 |                            |   |   |   |   |   |   |   |   | 14 |    |    | 1  |    | 20 |

### Causes:

1 - Viral diseases

2 - Bacterial diseases

3 - Fungal diseases

4 - Parasitary diseases

5 - Tumors

6 - Injuries

7 - Digestive tract diseases

8 - Respiratory tract diseases

9 - Reproduction tract diseases

10 - Locomotion apparatus diseases

11 - Sudden death syndrome

12 - Cannibalism

13 - Diverticulus inflammation

14 - Culling and other causes

15 - Sampling (excluded of calculation)

**Foot pad lesions****Tab. No. 4**

| Treatment | Tr. No. | Evaluation |           |
|-----------|---------|------------|-----------|
|           |         | right foot | left foot |
| T1        | 1       | 1.86       | 1.93      |
| T2        | 2       | 1.95       | 1.94      |
| T3        | 3       | 2.00       | 2.04      |
| T4        | 4       | 2.02       | 2.06      |
| T5        | 5       | 1.98       | 2.06      |
| T6        | 6       | 1.96       | 2.00      |

**Statistical analysis - Body weight at 35 days of age**

**Tab. No. 5**

| Treatment | Tr.<br>No. | Cocks           |                     |                    |                          |
|-----------|------------|-----------------|---------------------|--------------------|--------------------------|
|           |            | No. of<br>birds | Average body weight | Standard deviation | Coefficient of variation |
|           |            |                 | g/birds             | g/birds            | %                        |
| T1        | 1          | 1267            | 2323.75             | 370.98             | 15.96                    |
| T2        | 2          | 1270            | 2372.94             | 353.33             | 14.89                    |
| T3        | 3          | 1259            | 2386.17             | 368.61             | 15.45                    |
| T4        | 4          | 1268            | 2335.30             | 352.25             | 15.08                    |
| T5        | 5          | 1263            | 2303.78             | 373.51             | 16.21                    |
| T6        | 6          | 1265            | 2233.98             | 368.66             | 16.50                    |

### Statistical analyses of performance results

Performance results were statistically evaluated using the ANOVA single-factor model (Duncan test, Scheffe test).

The following symbols are used for levels of significance:

|                |     |                                         |
|----------------|-----|-----------------------------------------|
| $p \leq 0,001$ | *** | - differences are very high significant |
| $p \leq 0,01$  | **  | - differences are high significant      |
| $p \leq 0,05$  | *   | - differences are significant           |
| $p > 0,05$     | o   | - differences are not significant       |

#### Body weight - day 1

Tab. No. 6a

| Treatment | Treat. No. | No. of box | Average (g) | Standard deviation | Duncan test |          |          |          |          |    |
|-----------|------------|------------|-------------|--------------------|-------------|----------|----------|----------|----------|----|
|           |            |            |             |                    | T1          | T2       | T3       | T4       | T5       | T6 |
| T1        | 1          | 10         | 40.62       | 0.71               |             | o        | o        | o        | o        | o  |
| T2        | 2          | 10         | 40.54       | 0.52               | 0.801643    |          | o        | o        | o        | o  |
| T3        | 3          | 10         | 40.54       | 0.71               | 0.815511    | 0.995199 |          | o        | o        | o  |
| T4        | 4          | 10         | 40.54       | 0.66               | 0.813653    | 0.997586 | 0.997309 |          | o        | o  |
| T5        | 5          | 10         | 40.58       | 0.66               | 0.891726    | 0.894494 | 0.905124 | 0.904626 |          | o  |
| T6        | 6          | 10         | 40.54       | 0.55               | 0.807065    | 0.997309 | 0.997586 | 1.000000 | 0.899088 |    |

#### Body weight - day 10

Tab. No. 6b

| Treatment | Treat. No. | No. of box | Average (g) | Standard deviation | Duncan test |          |          |          |          |    |
|-----------|------------|------------|-------------|--------------------|-------------|----------|----------|----------|----------|----|
|           |            |            |             |                    | T1          | T2       | T3       | T4       | T5       | T6 |
| T1        | 1          | 10         | 282.92      | 7.21               |             | o        | o        | o        | o        | o  |
| T2        | 2          | 10         | 280.77      | 4.14               | 0.442887    |          | o        | o        | o        | o  |
| T3        | 3          | 10         | 282.54      | 5.15               | 0.876036    | 0.518207 |          | o        | o        | o  |
| T4        | 4          | 10         | 281.49      | 4.32               | 0.601490    | 0.769336 | 0.691422 |          | o        | o  |
| T5        | 5          | 10         | 280.15      | 5.31               | 0.332050    | 0.802902 | 0.395415 | 0.611528 |          | o  |
| T6        | 6          | 10         | 282.42      | 6.16               | 0.849770    | 0.530263 | 0.962752 | 0.705862 | 0.406957 |    |

Body weight - day 24

Tab. No. 6c

| Treatment | Treat. No. | No. of birds | Average (g) | Standard deviation | Scheffe test |          |          |          |          |    |
|-----------|------------|--------------|-------------|--------------------|--------------|----------|----------|----------|----------|----|
|           |            |              |             |                    | T1           | T2       | T3       | T4       | T5       | T6 |
| T1        | 1          | 1276         | 1249.18     | 229.91             |              | 0        | 0        | 0        | 0        | 0  |
| T2        | 2          | 1276         | 1264.55     | 218.71             | 0.681845     |          | 0        | 0        | 0        | 0  |
| T3        | 3          | 1274         | 1247.89     | 224.19             | 0.999996     | 0.598898 |          | *        | 0        | 0  |
| T4        | 4          | 1275         | 1277.53     | 211.07             | 0.060009     | 0.817665 | 0.041060 |          | *        | 0  |
| T5        | 5          | 1272         | 1240.04     | 219.23             | 0.953881     | 0.160839 | 0.976295 | 0.002383 |          | 0  |
| T6        | 6          | 1274         | 1249.84     | 215.47             | 1.000000     | 0.721978 | 0.999971 | 0.072242 | 0.938607 |    |

Body weight - day 35

Tab. No. 6d

| Treatment | Treat. No. | No. of birds | Average (g) | Standard deviation | Scheffe test |          |          |          |          |     |
|-----------|------------|--------------|-------------|--------------------|--------------|----------|----------|----------|----------|-----|
|           |            |              |             |                    | T1           | T2       | T3       | T4       | T5       | T6  |
| T1        | 1          | 1267         | 2323.75     | 370.98             |              | *        | *        | 0        | 0        | *** |
| T2        | 2          | 1270         | 2372.94     | 353.33             | 0.041750     |          | 0        | 0        | ***      | *** |
| T3        | 3          | 1259         | 2386.17     | 368.61             | 0.002393     | 0.974882 |          | *        | ***      | *** |
| T4        | 4          | 1268         | 2335.30     | 352.25             | 0.986294     | 0.239248 | 0.031040 |          | 0        | *** |
| T5        | 5          | 1263         | 2303.78     | 373.51             | 0.863318     | 0.000378 | 0.000006 | 0.450230 |          | *** |
| T6        | 6          | 1265         | 2233.98     | 368.66             | 0.000000     | 0.000000 | 0.000000 | 0.000000 | 0.000318 |     |

FCR - day 10

Tab. No. 7a

| Treatment | Treat. No. | No. of box | Average (g) | Standard deviation | Duncan test |          |          |          |          |    |
|-----------|------------|------------|-------------|--------------------|-------------|----------|----------|----------|----------|----|
|           |            |            |             |                    | T1          | T2       | T3       | T4       | T5       | T6 |
| T1        | 1          | 10         | 1014.78     | 48.71              |             | o        | o        | o        | o        | o  |
| T2        | 2          | 10         | 1025.25     | 34.02              | 0.544440    |          | o        | o        | o        | o  |
| T3        | 3          | 10         | 997.72      | 34.52              | 0.354800    | 0.149536 |          | o        | o        | o  |
| T4        | 4          | 10         | 1032.71     | 40.75              | 0.349004    | 0.685940 | 0.078242 |          | o        | o  |
| T5        | 5          | 10         | 1004.21     | 41.76              | 0.540628    | 0.253816 | 0.706815 | 0.145329 |          | o  |
| T6        | 6          | 10         | 1030.00     | 26.60              | 0.409156    | 0.783163 | 0.098596 | 0.875210 | 0.177202 |    |

FCR - day 24

Tab. No. 7b

| Treatment | Treat. No. | No. of box | Average (g) | Standard deviation | Duncan test |          |          |          |          |    |
|-----------|------------|------------|-------------|--------------------|-------------|----------|----------|----------|----------|----|
|           |            |            |             |                    | T1          | T2       | T3       | T4       | T5       | T6 |
| T1        | 1          | 10         | 1279.98     | 61.21              |             | o        | o        | o        | o        | o  |
| T2        | 2          | 10         | 1267.56     | 47.96              | 0.643187    |          | o        | o        | o        | o  |
| T3        | 3          | 10         | 1283.56     | 40.74              | 0.886370    | 0.565702 |          | o        | o        | o  |
| T4        | 4          | 10         | 1275.14     | 37.77              | 0.847021    | 0.762490 | 0.753507 |          | o        | o  |
| T5        | 5          | 10         | 1300.47     | 70.59              | 0.444672    | 0.248267 | 0.501031 | 0.362821 |          | o  |
| T6        | 6          | 10         | 1303.31     | 67.48              | 0.402007    | 0.217705 | 0.461359 | 0.323440 | 0.909834 |    |

FCR - day 35

Tab. No. 7c

| Treatment | Treat. No. | No. of box | Average (g) | Standard deviation | Duncan test |          |          |          |          |     |
|-----------|------------|------------|-------------|--------------------|-------------|----------|----------|----------|----------|-----|
|           |            |            |             |                    | T1          | T2       | T3       | T4       | T5       | T6  |
| T1        | 1          | 10         | 1507.90     | 61.67              |             | o        | o        | o        | o        | **  |
| T2        | 2          | 10         | 1473.84     | 40.01              | 0.214348    |          | o        | o        | o        | *** |
| T3        | 3          | 10         | 1468.25     | 67.60              | 0.163049    | 0.827636 |          | o        | *        | *** |
| T4        | 4          | 10         | 1506.97     | 52.88              | 0.971147    | 0.199973 | 0.158146 |          | o        | **  |
| T5        | 5          | 10         | 1525.96     | 58.47              | 0.482317    | 0.066191 | 0.046602 | 0.488620 |          | *   |
| T6        | 6          | 10         | 1582.85     | 57.95              | 0.006721    | 0.000213 | 0.000128 | 0.007482 | 0.030120 |     |

## Performance results per replicate

### Body weight per phases

Tab. No. 8a (page 1)

| Treatment | Tr. No. | Pen | Day 1 |                     | Day 10 |                     | Day 24 |                     | Day 35 |                     |
|-----------|---------|-----|-------|---------------------|--------|---------------------|--------|---------------------|--------|---------------------|
|           |         |     | Birds | Average body weight | Birds  | Average body weight | Birds  | Average body weight | Birds  | Average body weight |
|           |         |     |       | g                   |        | g                   |        | g                   |        | g                   |
| T1        | 1       | 1   | 130   | 41.92               | 130    | 290.77              | 128    | 1186.41             | 126    | 2416.51             |
|           |         | 7   | 130   | 41.54               | 130    | 281.92              | 126    | 1273.10             | 126    | 2467.14             |
|           |         | 13  | 130   | 40.38               | 130    | 278.08              | 127    | 1177.17             | 124    | 2152.34             |
|           |         | 19  | 130   | 39.62               | 130    | 283.46              | 128    | 1219.38             | 127    | 2324.41             |
|           |         | 25  | 130   | 40.77               | 130    | 282.31              | 128    | 1348.75             | 128    | 2364.06             |
|           |         | 36  | 130   | 40.00               | 130    | 293.08              | 127    | 1192.83             | 127    | 2294.96             |
|           |         | 42  | 130   | 40.38               | 130    | 292.31              | 128    | 1236.72             | 128    | 2407.03             |
|           |         | 48  | 130   | 40.77               | 130    | 275.77              | 128    | 1283.44             | 127    | 2279.13             |
|           |         | 54  | 130   | 40.00               | 130    | 280.00              | 128    | 1319.61             | 127    | 2210.87             |
|           |         | 60  | 130   | 40.77               | 130    | 271.54              | 128    | 1253.83             | 127    | 2317.87             |
| T2        | 2       | 2   | 130   | 41.54               | 130    | 288.08              | 128    | 1218.52             | 128    | 2397.58             |
|           |         | 8   | 130   | 40.77               | 130    | 280.38              | 127    | 1230.55             | 127    | 2451.34             |
|           |         | 14  | 130   | 40.38               | 130    | 275.38              | 126    | 1249.37             | 126    | 2390.95             |
|           |         | 20  | 130   | 39.62               | 130    | 278.46              | 127    | 1233.07             | 126    | 2380.56             |
|           |         | 26  | 130   | 40.38               | 130    | 276.54              | 128    | 1345.63             | 128    | 2460.39             |
|           |         | 35  | 130   | 40.77               | 130    | 285.77              | 128    | 1202.34             | 128    | 2352.27             |
|           |         | 41  | 130   | 40.00               | 130    | 283.85              | 128    | 1212.81             | 128    | 2396.17             |
|           |         | 47  | 130   | 40.38               | 130    | 277.69              | 128    | 1262.34             | 126    | 2191.83             |
|           |         | 53  | 130   | 40.77               | 130    | 282.31              | 128    | 1348.91             | 126    | 2345.00             |
|           |         | 59  | 130   | 40.77               | 130    | 279.23              | 128    | 1341.25             | 127    | 2360.94             |
| T3        | 3       | 3   | 130   | 41.15               | 130    | 278.46              | 128    | 1136.88             | 127    | 2375.67             |
|           |         | 9   | 130   | 41.54               | 130    | 283.85              | 127    | 1271.65             | 127    | 2530.31             |
|           |         | 15  | 130   | 41.15               | 130    | 279.23              | 128    | 1262.42             | 127    | 2484.72             |
|           |         | 21  | 130   | 39.23               | 130    | 276.15              | 128    | 1209.06             | 125    | 2336.96             |
|           |         | 27  | 130   | 40.38               | 130    | 284.62              | 126    | 1347.78             | 125    | 2616.32             |
|           |         | 34  | 130   | 40.38               | 130    | 280.00              | 127    | 1190.94             | 127    | 2304.72             |
|           |         | 40  | 130   | 40.00               | 130    | 277.69              | 127    | 1222.91             | 126    | 2235.95             |
|           |         | 46  | 130   | 40.38               | 130    | 284.62              | 128    | 1233.36             | 120    | 2305.83             |
|           |         | 52  | 130   | 40.00               | 130    | 288.46              | 128    | 1263.28             | 128    | 2327.42             |
|           |         | 58  | 130   | 41.15               | 130    | 292.31              | 127    | 1342.44             | 127    | 2341.50             |

**Body weight per phases**
**Tab. No. 8a (page 2)**

| Treatment | Tr. No. | Pen | Day 1 |                     | Day 10 |                     | Day 24 |                     | Day 35 |                     |
|-----------|---------|-----|-------|---------------------|--------|---------------------|--------|---------------------|--------|---------------------|
|           |         |     | Birds | Average body weight | Birds  | Average body weight | Birds  | Average body weight | Birds  | Average body weight |
|           |         |     |       | g                   |        | g                   |        | g                   |        | g                   |
| T4        | 4       | 4   | 130   | 41.54               | 130    | 272.23              | 127    | 1256.14             | 126    | 2490.79             |
|           |         | 10  | 130   | 41.54               | 130    | 287.69              | 126    | 1342.14             | 125    | 2465.36             |
|           |         | 16  | 130   | 40.38               | 130    | 282.31              | 127    | 1234.17             | 127    | 2417.48             |
|           |         | 22  | 130   | 39.62               | 130    | 285.00              | 127    | 1277.95             | 125    | 2257.44             |
|           |         | 28  | 130   | 40.38               | 130    | 282.31              | 128    | 1299.92             | 128    | 2476.95             |
|           |         | 33  | 130   | 40.38               | 130    | 285.77              | 128    | 1197.73             | 128    | 2173.59             |
|           |         | 39  | 130   | 40.00               | 130    | 278.85              | 128    | 1270.00             | 127    | 2221.18             |
|           |         | 45  | 130   | 40.00               | 130    | 280.38              | 128    | 1226.33             | 127    | 2285.67             |
|           |         | 51  | 130   | 40.38               | 130    | 280.38              | 128    | 1339.69             | 128    | 2237.66             |
|           |         | 57  | 130   | 41.15               | 130    | 280.00              | 128    | 1331.72             | 127    | 2329.84             |
| T5        | 5       | 5   | 130   | 41.15               | 130    | 282.69              | 128    | 1287.97             | 127    | 2610.63             |
|           |         | 11  | 130   | 41.54               | 130    | 282.31              | 127    | 1214.49             | 127    | 2249.29             |
|           |         | 17  | 130   | 41.15               | 130    | 285.38              | 128    | 1159.53             | 128    | 2282.66             |
|           |         | 23  | 130   | 39.62               | 130    | 277.69              | 127    | 1181.65             | 124    | 2178.15             |
|           |         | 29  | 130   | 40.00               | 130    | 267.69              | 128    | 1347.89             | 128    | 2313.28             |
|           |         | 32  | 130   | 40.77               | 130    | 284.23              | 126    | 1180.00             | 125    | 2256.24             |
|           |         | 38  | 130   | 40.00               | 130    | 282.31              | 126    | 1248.57             | 125    | 2307.04             |
|           |         | 44  | 130   | 40.38               | 130    | 276.54              | 127    | 1197.56             | 126    | 2298.89             |
|           |         | 50  | 130   | 40.00               | 130    | 278.46              | 127    | 1289.13             | 126    | 2311.51             |
|           |         | 56  | 130   | 41.15               | 130    | 284.23              | 128    | 1292.19             | 127    | 2226.61             |
| T6        | 6       | 6   | 130   | 41.15               | 130    | 287.69              | 127    | 1281.89             | 126    | 2348.33             |
|           |         | 12  | 130   | 41.15               | 130    | 286.15              | 128    | 1215.08             | 128    | 2248.59             |
|           |         | 18  | 130   | 40.77               | 130    | 276.15              | 128    | 1259.06             | 127    | 2293.46             |
|           |         | 24  | 130   | 39.62               | 130    | 275.38              | 126    | 1375.48             | 126    | 2423.89             |
|           |         | 30  | 130   | 40.00               | 130    | 286.15              | 128    | 1380.94             | 126    | 2297.22             |
|           |         | 31  | 130   | 40.38               | 130    | 292.69              | 127    | 1202.83             | 126    | 2208.89             |
|           |         | 37  | 130   | 40.00               | 130    | 276.54              | 127    | 1115.98             | 127    | 2141.34             |
|           |         | 43  | 130   | 40.38               | 130    | 285.00              | 127    | 1201.18             | 127    | 2185.28             |
|           |         | 49  | 130   | 40.77               | 130    | 283.08              | 128    | 1196.48             | 127    | 2077.48             |
|           |         | 55  | 130   | 41.15               | 130    | 275.38              | 128    | 1269.84             | 125    | 2116.00             |

Weight gain per phases (WG) and daily weight gain

Tab. No. 8b (page 1)

| Treatment | Tr. No. | Box | Day 1 - 10 |       | Day 11 - 24 |       | Day 25 - 35 |        | Day 1 - 35 |       |
|-----------|---------|-----|------------|-------|-------------|-------|-------------|--------|------------|-------|
|           |         |     | WG         | DWG   | WG          | DWG   | WG          | DWG    | WG         | DWG   |
|           |         |     | g          | g     | g           | g     | g           | g      | g          | g     |
| T1        | 1       | 1   | 248.85     | 24.88 | 895.64      | 63.97 | 1230.10     | 111.83 | 2374.59    | 67.85 |
|           |         | 7   | 240.38     | 24.04 | 991.17      | 70.80 | 1194.05     | 108.55 | 2425.60    | 69.30 |
|           |         | 13  | 237.70     | 23.77 | 899.09      | 64.22 | 975.17      | 88.65  | 2111.96    | 60.34 |
|           |         | 19  | 243.84     | 24.38 | 935.91      | 66.85 | 1105.03     | 100.46 | 2284.79    | 65.28 |
|           |         | 25  | 241.54     | 24.15 | 1066.44     | 76.17 | 1015.31     | 92.30  | 2323.29    | 66.38 |
|           |         | 36  | 253.08     | 25.31 | 899.76      | 64.27 | 1102.13     | 100.19 | 2254.96    | 64.43 |
|           |         | 42  | 251.93     | 25.19 | 944.41      | 67.46 | 1170.31     | 106.39 | 2366.65    | 67.62 |
|           |         | 48  | 235.00     | 23.50 | 1007.67     | 71.98 | 995.70      | 90.52  | 2238.36    | 63.95 |
|           |         | 54  | 240.00     | 24.00 | 1039.61     | 74.26 | 891.26      | 81.02  | 2170.87    | 62.02 |
|           |         | 60  | 230.77     | 23.08 | 982.29      | 70.16 | 1064.05     | 96.73  | 2277.10    | 65.06 |
| T2        | 2       | 2   | 246.54     | 24.65 | 930.44      | 66.46 | 1179.06     | 107.19 | 2356.04    | 67.32 |
|           |         | 8   | 239.61     | 23.96 | 950.17      | 67.87 | 1220.79     | 110.98 | 2410.57    | 68.87 |
|           |         | 14  | 235.00     | 23.50 | 973.98      | 69.57 | 1141.59     | 103.78 | 2350.57    | 67.16 |
|           |         | 20  | 238.84     | 23.88 | 954.61      | 68.19 | 1147.48     | 104.32 | 2340.94    | 66.88 |
|           |         | 26  | 236.16     | 23.62 | 1069.09     | 76.36 | 1114.77     | 101.34 | 2420.01    | 69.14 |
|           |         | 35  | 245.00     | 24.50 | 916.57      | 65.47 | 1149.92     | 104.54 | 2311.50    | 66.04 |
|           |         | 41  | 243.85     | 24.38 | 928.97      | 66.35 | 1183.36     | 107.58 | 2356.17    | 67.32 |
|           |         | 47  | 237.31     | 23.73 | 984.65      | 70.33 | 929.48      | 84.50  | 2151.45    | 61.47 |
|           |         | 53  | 241.54     | 24.15 | 1066.60     | 76.19 | 996.09      | 90.55  | 2304.23    | 65.84 |
|           |         | 59  | 238.46     | 23.85 | 1062.02     | 75.86 | 1019.69     | 92.70  | 2320.17    | 66.29 |
| T3        | 3       | 3   | 237.31     | 23.73 | 858.41      | 61.32 | 1238.79     | 112.62 | 2334.52    | 66.70 |
|           |         | 9   | 242.31     | 24.23 | 987.81      | 70.56 | 1258.66     | 114.42 | 2488.77    | 71.11 |
|           |         | 15  | 238.08     | 23.81 | 983.19      | 70.23 | 1222.30     | 111.12 | 2443.57    | 69.82 |
|           |         | 21  | 236.92     | 23.69 | 932.91      | 66.64 | 1127.90     | 102.54 | 2297.73    | 65.65 |
|           |         | 27  | 244.24     | 24.42 | 1063.16     | 75.94 | 1268.54     | 115.32 | 2575.94    | 73.60 |
|           |         | 34  | 239.62     | 23.96 | 910.94      | 65.07 | 1113.78     | 101.25 | 2264.34    | 64.70 |
|           |         | 40  | 237.69     | 23.77 | 945.22      | 67.52 | 1013.04     | 92.09  | 2195.95    | 62.74 |
|           |         | 46  | 244.24     | 24.42 | 948.74      | 67.77 | 1072.47     | 97.50  | 2265.45    | 64.73 |
|           |         | 52  | 248.46     | 24.85 | 974.82      | 69.63 | 1064.14     | 96.74  | 2287.42    | 65.35 |
|           |         | 58  | 251.16     | 25.12 | 1050.13     | 75.01 | 999.06      | 90.82  | 2300.35    | 65.72 |

Weight gain per phases (WG) and daily weight gain

Tab. No. 8b (page 2)

| Treatment | Tr. No. | Box | Day 1 - 10 |       | Day 11 - 24 |       | Day 25 - 35 |        | Day 1 - 35 |       |
|-----------|---------|-----|------------|-------|-------------|-------|-------------|--------|------------|-------|
|           |         |     | WG         | DWG   | WG          | DWG   | WG          | DWG    | WG         | DWG   |
|           |         |     | g          | g     | g           | g     | g           | g      | g          | g     |
| T4        | 4       | 4   | 230.69     | 23.07 | 983.91      | 70.28 | 1234.65     | 112.24 | 2449.25    | 69.98 |
|           |         | 10  | 246.15     | 24.62 | 1054.45     | 75.32 | 1123.22     | 102.11 | 2423.82    | 69.25 |
|           |         | 16  | 241.93     | 24.19 | 951.87      | 67.99 | 1183.31     | 107.57 | 2377.10    | 67.92 |
|           |         | 22  | 245.38     | 24.54 | 992.95      | 70.93 | 979.49      | 89.04  | 2217.82    | 63.37 |
|           |         | 28  | 241.93     | 24.19 | 1017.61     | 72.69 | 1177.03     | 107.00 | 2436.57    | 69.62 |
|           |         | 33  | 245.39     | 24.54 | 911.97      | 65.14 | 975.86      | 88.71  | 2133.21    | 60.95 |
|           |         | 39  | 238.85     | 23.88 | 991.15      | 70.80 | 951.18      | 86.47  | 2181.18    | 62.32 |
|           |         | 45  | 240.38     | 24.04 | 945.94      | 67.57 | 1059.34     | 96.30  | 2245.67    | 64.16 |
|           |         | 51  | 240.00     | 24.00 | 1059.30     | 75.66 | 897.97      | 81.63  | 2197.28    | 62.78 |
|           |         | 57  | 238.85     | 23.89 | 1051.72     | 75.12 | 998.12      | 90.74  | 2288.69    | 65.39 |
| T5        | 5       | 5   | 241.54     | 24.15 | 1005.28     | 71.81 | 1322.66     | 120.24 | 2569.48    | 73.41 |
|           |         | 11  | 240.77     | 24.08 | 932.18      | 66.58 | 1034.80     | 94.07  | 2207.75    | 63.08 |
|           |         | 17  | 244.23     | 24.42 | 874.15      | 62.44 | 1123.13     | 102.10 | 2241.51    | 64.04 |
|           |         | 23  | 238.07     | 23.81 | 903.96      | 64.57 | 996.49      | 90.59  | 2138.53    | 61.10 |
|           |         | 29  | 227.69     | 22.77 | 1080.20     | 77.16 | 965.39      | 87.76  | 2273.28    | 64.95 |
|           |         | 32  | 243.46     | 24.35 | 895.77      | 63.98 | 1076.24     | 97.84  | 2215.47    | 63.30 |
|           |         | 38  | 242.31     | 24.23 | 966.26      | 69.02 | 1058.47     | 96.22  | 2267.04    | 64.77 |
|           |         | 44  | 236.16     | 23.62 | 921.02      | 65.79 | 1101.33     | 100.12 | 2258.51    | 64.53 |
|           |         | 50  | 238.46     | 23.85 | 1010.67     | 72.19 | 1022.37     | 92.94  | 2271.51    | 64.90 |
|           |         | 56  | 243.08     | 24.31 | 1007.96     | 72.00 | 934.43      | 84.95  | 2185.46    | 62.44 |
| T6        | 6       | 6   | 246.54     | 24.65 | 994.20      | 71.01 | 1066.44     | 96.95  | 2307.18    | 65.92 |
|           |         | 12  | 245.00     | 24.50 | 928.92      | 66.35 | 1033.52     | 93.96  | 2207.44    | 63.07 |
|           |         | 18  | 235.38     | 23.54 | 982.91      | 70.21 | 1034.40     | 94.04  | 2252.69    | 64.36 |
|           |         | 24  | 235.76     | 23.58 | 1100.09     | 78.58 | 1048.41     | 95.31  | 2384.27    | 68.12 |
|           |         | 30  | 246.15     | 24.62 | 1094.78     | 78.20 | 916.28      | 83.30  | 2257.22    | 64.49 |
|           |         | 31  | 252.31     | 25.23 | 910.14      | 65.01 | 1006.05     | 91.46  | 2168.51    | 61.96 |
|           |         | 37  | 236.54     | 23.65 | 839.45      | 59.96 | 1025.35     | 93.21  | 2101.34    | 60.04 |
|           |         | 43  | 244.62     | 24.46 | 916.18      | 65.44 | 984.09      | 89.46  | 2144.90    | 61.28 |
|           |         | 49  | 242.31     | 24.23 | 913.41      | 65.24 | 881.00      | 80.09  | 2036.71    | 58.19 |
|           |         | 55  | 234.23     | 23.42 | 994.46      | 71.03 | 846.16      | 76.92  | 2074.85    | 59.28 |

Feed conversion per 1 kg of live weight

Tab. No. 8c (page 1)

| Treatment | Tr. No. | Box | Feed conversion ratio |                  |                  |
|-----------|---------|-----|-----------------------|------------------|------------------|
|           |         |     | Day 10                | Day 24           | Day 35           |
|           |         |     | g/kg live weight      | g/kg live weight | g/kg live weight |
| T1        | 1       | 1   | 1018.52               | 1288.38          | 1437.65          |
|           |         | 7   | 982.26                | 1207.64          | 1378.43          |
|           |         | 13  | 1040.11               | 1340.69          | 1570.33          |
|           |         | 19  | 976.93                | 1356.11          | 1523.45          |
|           |         | 25  | 1016.35               | 1190.92          | 1484.43          |
|           |         | 36  | 944.88                | 1350.22          | 1576.14          |
|           |         | 42  | 968.42                | 1306.67          | 1506.66          |
|           |         | 48  | 1034.87               | 1257.71          | 1548.87          |
|           |         | 54  | 1054.95               | 1211.06          | 1546.57          |
|           |         | 60  | 1110.48               | 1290.38          | 1506.46          |
| T2        | 2       | 2   | 1038.72               | 1252.84          | 1435.50          |
|           |         | 8   | 1001.37               | 1276.30          | 1447.95          |
|           |         | 14  | 1086.59               | 1282.88          | 1468.10          |
|           |         | 20  | 1019.34               | 1284.96          | 1457.65          |
|           |         | 26  | 968.01                | 1198.97          | 1419.27          |
|           |         | 35  | 1041.72               | 1311.88          | 1490.10          |
|           |         | 41  | 994.58                | 1338.23          | 1491.40          |
|           |         | 47  | 1055.40               | 1308.45          | 1563.82          |
|           |         | 53  | 1008.17               | 1214.59          | 1491.87          |
|           |         | 59  | 1038.57               | 1206.46          | 1472.75          |
| T3        | 3       | 3   | 1038.67               | 1354.17          | 1401.76          |
|           |         | 9   | 953.93                | 1228.88          | 1365.13          |
|           |         | 15  | 994.49                | 1303.24          | 1449.13          |
|           |         | 21  | 938.72                | 1276.42          | 1448.25          |
|           |         | 27  | 1032.43               | 1251.84          | 1390.10          |
|           |         | 34  | 991.76                | 1303.75          | 1505.51          |
|           |         | 40  | 1016.62               | 1289.72          | 1568.23          |
|           |         | 46  | 1016.22               | 1310.44          | 1527.73          |
|           |         | 52  | 968.00                | 1297.95          | 1503.16          |
|           |         | 58  | 1026.32               | 1219.21          | 1523.54          |

Feed conversion per 1 kg of live weight

Tab. No. 8c (page 2)

| Treatment | Tr. No. | Box | Feed conversion ratio |                  |                  |
|-----------|---------|-----|-----------------------|------------------|------------------|
|           |         |     | Day 10                | Day 24           | Day 35           |
|           |         |     | g/kg live weight      | g/kg live weight | g/kg live weight |
| T4        | 4       | 4   | 1073.75               | 1318.74          | 1445.68          |
|           |         | 10  | 975.94                | 1249.74          | 1472.63          |
|           |         | 16  | 1108.99               | 1311.28          | 1472.20          |
|           |         | 22  | 990.55                | 1297.25          | 1548.64          |
|           |         | 28  | 1029.97               | 1249.41          | 1424.64          |
|           |         | 33  | 1020.19               | 1270.15          | 1536.96          |
|           |         | 39  | 1017.93               | 1280.49          | 1587.55          |
|           |         | 45  | 1053.50               | 1325.86          | 1562.69          |
|           |         | 51  | 1056.24               | 1227.84          | 1509.87          |
|           |         | 57  | 1000.00               | 1220.64          | 1508.83          |
| T5        | 5       | 5   | 1006.80               | 1236.26          | 1375.06          |
|           |         | 11  | 1005.45               | 1314.34          | 1559.16          |
|           |         | 17  | 1016.17               | 1384.01          | 1568.68          |
|           |         | 23  | 939.06                | 1356.73          | 1535.44          |
|           |         | 29  | 1060.34               | 1179.22          | 1502.16          |
|           |         | 32  | 952.64                | 1322.28          | 1527.76          |
|           |         | 38  | 970.03                | 1299.51          | 1521.19          |
|           |         | 44  | 1040.33               | 1404.46          | 1573.90          |
|           |         | 50  | 1058.01               | 1248.05          | 1524.63          |
|           |         | 56  | 993.23                | 1259.81          | 1571.65          |
| T6        | 6       | 6   | 1013.37               | 1259.30          | 1502.48          |
|           |         | 12  | 1013.44               | 1283.14          | 1569.50          |
|           |         | 18  | 1041.78               | 1262.88          | 1561.31          |
|           |         | 24  | 994.41                | 1209.37          | 1488.03          |
|           |         | 30  | 1059.14               | 1233.71          | 1562.70          |
|           |         | 31  | 1069.65               | 1371.39          | 1588.95          |
|           |         | 37  | 1031.99               | 1428.86          | 1612.73          |
|           |         | 43  | 1020.24               | 1354.62          | 1637.08          |
|           |         | 49  | 997.28                | 1310.96          | 1657.94          |
|           |         | 55  | 1058.66               | 1318.86          | 1647.79          |

Feed conversion per 1 kg of weight gain

Tab. No. 8d (page 1)

| Treatment | Tr. No. | Box | Feed conversion ratio |                  |                  |                  |
|-----------|---------|-----|-----------------------|------------------|------------------|------------------|
|           |         |     | Day 1-10              | Day 11-24        | Day 25-35        | Day 1-35         |
|           |         |     | g/kg weight gain      | g/kg weight gain | g/kg weight gain | g/kg weight gain |
| T1        | 1       | 1   | 1190.09               | 1375.88          | 1584.21          | 1463.24          |
|           |         | 7   | 1152.01               | 1272.48          | 1564.64          | 1402.51          |
|           |         | 13  | 1216.80               | 1433.69          | 1861.97          | 1601.07          |
|           |         | 19  | 1135.67               | 1470.59          | 1712.66          | 1550.11          |
|           |         | 25  | 1187.90               | 1237.11          | 1880.58          | 1510.65          |
|           |         | 36  | 1094.22               | 1482.48          | 1826.11          | 1604.44          |
|           |         | 42  | 1123.64               | 1411.15          | 1721.63          | 1532.54          |
|           |         | 48  | 1214.41               | 1318.60          | 1934.09          | 1577.37          |
|           |         | 54  | 1230.77               | 1253.05          | 2054.45          | 1575.30          |
|           |         | 60  | 1306.67               | 1339.94          | 1767.15          | 1533.66          |
| T2        | 2       | 2   | 1213.74               | 1319.07          | 1627.35          | 1460.99          |
|           |         | 8   | 1171.75               | 1357.62          | 1624.74          | 1472.76          |
|           |         | 14  | 1273.30               | 1338.75          | 1676.17          | 1493.77          |
|           |         | 20  | 1188.43               | 1362.49          | 1649.34          | 1482.73          |
|           |         | 26  | 1133.53               | 1258.62          | 1689.68          | 1443.10          |
|           |         | 35  | 1215.07               | 1395.66          | 1680.14          | 1516.53          |
|           |         | 41  | 1157.73               | 1442.97          | 1651.15          | 1516.89          |
|           |         | 47  | 1234.98               | 1379.74          | 1921.34          | 1593.53          |
|           |         | 53  | 1178.35               | 1269.19          | 1874.56          | 1518.47          |
|           |         | 59  | 1216.13               | 1250.54          | 1833.23          | 1498.93          |
| T3        | 3       | 3   | 1218.78               | 1456.47          | 1446.22          | 1426.69          |
|           |         | 9   | 1117.47               | 1308.52          | 1505.16          | 1388.25          |
|           |         | 15  | 1166.38               | 1390.60          | 1603.78          | 1473.77          |
|           |         | 21  | 1094.15               | 1376.08          | 1637.90          | 1473.27          |
|           |         | 27  | 1203.13               | 1311.00          | 1541.20          | 1412.33          |
|           |         | 34  | 1158.89               | 1399.62          | 1726.41          | 1532.67          |
|           |         | 40  | 1187.70               | 1370.23          | 1913.22          | 1597.21          |
|           |         | 46  | 1184.23               | 1398.61          | 1803.99          | 1556.22          |
|           |         | 52  | 1123.84               | 1395.39          | 1750.97          | 1529.61          |
|           |         | 58  | 1194.47               | 1273.19          | 1940.42          | 1551.14          |

Feed conversion per 1 kg of weight gain

Tab. No. 8d (page 2)

| Treatment | Tr. No. | Box | Feed conversion ratio |                  |                  |                  |
|-----------|---------|-----|-----------------------|------------------|------------------|------------------|
|           |         |     | Day 1-10              | Day 11-24        | Day 25-35        | Day 1-35         |
|           |         |     | g/kg weight gain      | g/kg weight gain | g/kg weight gain | g/kg weight gain |
| T4        | 4       | 4   | 1267.10               | 1386.71          | 1578.23          | 1470.58          |
|           |         | 10  | 1140.63               | 1325.35          | 1746.72          | 1498.45          |
|           |         | 16  | 1294.09               | 1371.16          | 1644.26          | 1497.48          |
|           |         | 22  | 1150.49               | 1385.55          | 1886.93          | 1576.75          |
|           |         | 28  | 1201.88               | 1310.15          | 1621.53          | 1448.41          |
|           |         | 33  | 1188.07               | 1348.04          | 1870.95          | 1566.19          |
|           |         | 39  | 1188.41               | 1354.05          | 2008.00          | 1616.88          |
|           |         | 45  | 1228.80               | 1406.43          | 1843.29          | 1590.78          |
|           |         | 51  | 1233.95               | 1273.22          | 1937.53          | 1537.78          |
|           |         | 57  | 1172.28               | 1279.32          | 1902.55          | 1536.21          |
| T5        | 5       | 5   | 1178.33               | 1300.79          | 1513.01          | 1397.32          |
|           |         | 11  | 1178.92               | 1408.07          | 1852.84          | 1588.84          |
|           |         | 17  | 1187.38               | 1503.82          | 1762.66          | 1597.68          |
|           |         | 23  | 1095.34               | 1485.13          | 1757.81          | 1564.54          |
|           |         | 29  | 1246.62               | 1208.69          | 1960.02          | 1528.77          |
|           |         | 32  | 1112.17               | 1440.67          | 1759.53          | 1556.47          |
|           |         | 38  | 1130.16               | 1396.50          | 1792.83          | 1548.67          |
|           |         | 44  | 1218.22               | 1514.09          | 1762.68          | 1602.43          |
|           |         | 50  | 1235.48               | 1300.66          | 1882.39          | 1551.89          |
|           |         | 56  | 1161.37               | 1334.81          | 2015.00          | 1601.54          |
| T6        | 6       | 6   | 1182.51               | 1330.88          | 1802.30          | 1529.72          |
|           |         | 12  | 1183.65               | 1365.89          | 1912.47          | 1598.92          |
|           |         | 18  | 1222.23               | 1324.85          | 1935.40          | 1589.90          |
|           |         | 24  | 1161.52               | 1263.86          | 1861.47          | 1513.24          |
|           |         | 30  | 1231.25               | 1279.33          | 2072.28          | 1590.69          |
|           |         | 31  | 1240.83               | 1468.82          | 1854.97          | 1618.94          |
|           |         | 37  | 1206.50               | 1559.51          | 1817.69          | 1643.77          |
|           |         | 43  | 1188.66               | 1458.98          | 1989.12          | 1668.28          |
|           |         | 49  | 1165.08               | 1407.93          | 2139.35          | 1691.37          |
|           |         | 55  | 1244.64               | 1390.75          | 2155.59          | 1680.78          |

Feed consumption per phases

Tab. No. 8e (page 1)

| Treatment | Tr. No. | Box | Feed consumption |                  |                    |                |
|-----------|---------|-----|------------------|------------------|--------------------|----------------|
|           |         |     | Starter (D 1-10) | Grower (D 11-24) | Finisher (D 25-35) | Total (D 1-35) |
|           |         |     | kg               | kg               | kg                 | kg             |
| T1        | 1       | 1   | 38.50            | 160.40           | 249.10             | 448.00         |
|           |         | 7   | 36.00            | 162.10           | 235.40             | 433.50         |
|           |         | 13  | 37.60            | 167.50           | 224.30             | 429.40         |
|           |         | 19  | 36.00            | 179.50           | 240.70             | 456.20         |
|           |         | 25  | 37.30            | 171.60           | 244.40             | 453.30         |
|           |         | 36  | 36.00            | 173.10           | 255.60             | 464.70         |
|           |         | 42  | 36.80            | 173.60           | 257.90             | 468.30         |
|           |         | 48  | 37.10            | 173.00           | 244.20             | 454.30         |
|           |         | 54  | 38.40            | 169.60           | 233.10             | 441.10         |
|           |         | 60  | 39.20            | 171.70           | 239.40             | 450.30         |
| T2        | 2       | 2   | 38.90            | 159.70           | 245.60             | 444.20         |
|           |         | 8   | 36.50            | 167.30           | 251.90             | 455.70         |
|           |         | 14  | 38.90            | 168.40           | 241.10             | 448.40         |
|           |         | 20  | 36.90            | 169.00           | 238.10             | 444.00         |
|           |         | 26  | 34.80            | 175.20           | 241.10             | 451.10         |
|           |         | 35  | 38.70            | 167.20           | 247.30             | 453.20         |
|           |         | 41  | 36.70            | 174.70           | 250.10             | 461.50         |
|           |         | 47  | 38.10            | 176.80           | 225.40             | 440.30         |
|           |         | 53  | 37.00            | 176.10           | 238.30             | 451.40         |
|           |         | 59  | 37.70            | 172.90           | 236.40             | 447.00         |
| T3        | 3       | 3   | 37.60            | 162.60           | 228.90             | 429.10         |
|           |         | 9   | 35.20            | 166.70           | 240.60             | 442.50         |
|           |         | 15  | 36.10            | 178.40           | 249.00             | 463.50         |
|           |         | 21  | 33.70            | 167.40           | 233.80             | 434.90         |
|           |         | 27  | 38.20            | 179.90           | 245.70             | 463.80         |
|           |         | 34  | 36.10            | 165.80           | 244.20             | 446.10         |
|           |         | 40  | 36.70            | 167.80           | 244.90             | 449.40         |
|           |         | 46  | 37.60            | 172.70           | 227.70             | 438.00         |
|           |         | 52  | 36.30            | 177.20           | 238.50             | 452.00         |
|           |         | 58  | 39.00            | 172.90           | 246.20             | 458.10         |

Feed consumption per phases

Tab. No. 8e (page 2)

| Treatment | Tr. No. | Box | Feed consumption |                  |                    |                |
|-----------|---------|-----|------------------|------------------|--------------------|----------------|
|           |         |     | Starter (D 1-10) | Grower (D 11-24) | Finisher (D 25-35) | Total (D 1-35) |
|           |         |     | kg               | kg               | kg                 | kg             |
| T4        | 4       | 4   | 38.00            | 176.90           | 246.30             | 461.20         |
|           |         | 10  | 36.50            | 179.50           | 245.50             | 461.50         |
|           |         | 16  | 40.70            | 170.00           | 247.10             | 457.80         |
|           |         | 22  | 36.70            | 178.30           | 232.40             | 447.40         |
|           |         | 28  | 37.80            | 173.70           | 244.30             | 455.80         |
|           |         | 33  | 37.90            | 160.70           | 233.70             | 432.30         |
|           |         | 39  | 36.90            | 175.20           | 242.90             | 455.00         |
|           |         | 45  | 38.40            | 173.30           | 248.40             | 460.10         |
|           |         | 51  | 38.50            | 175.50           | 222.70             | 436.70         |
|           |         | 57  | 36.40            | 175.10           | 241.30             | 452.80         |
| T5        | 5       | 5   | 37.00            | 170.00           | 254.90             | 461.90         |
|           |         | 11  | 36.90            | 170.30           | 243.50             | 450.70         |
|           |         | 17  | 37.70            | 171.30           | 253.40             | 462.40         |
|           |         | 23  | 33.90            | 174.40           | 216.90             | 425.20         |
|           |         | 29  | 36.90            | 169.70           | 242.20             | 448.80         |
|           |         | 32  | 35.20            | 166.20           | 237.60             | 439.00         |
|           |         | 38  | 35.60            | 174.10           | 236.10             | 445.80         |
|           |         | 44  | 37.40            | 180.80           | 245.80             | 464.00         |
|           |         | 50  | 38.30            | 170.10           | 243.00             | 451.40         |
|           |         | 56  | 36.70            | 175.30           | 238.50             | 450.50         |
| T6        | 6       | 6   | 37.90            | 171.00           | 242.50             | 451.40         |
|           |         | 12  | 37.70            | 165.60           | 253.00             | 456.30         |
|           |         | 18  | 37.40            | 169.70           | 253.20             | 460.30         |
|           |         | 24  | 35.60            | 178.50           | 245.90             | 460.00         |
|           |         | 30  | 39.40            | 182.10           | 240.20             | 461.70         |
|           |         | 31  | 40.70            | 173.10           | 236.50             | 450.30         |
|           |         | 37  | 37.10            | 170.30           | 236.70             | 444.10         |
|           |         | 43  | 37.80            | 173.20           | 248.60             | 459.60         |
|           |         | 49  | 36.70            | 167.60           | 240.30             | 444.60         |
|           |         | 55  | 37.90            | 180.20           | 230.90             | 449.00         |

| Treatment | Tr. No. | Box | Evaluation |           |
|-----------|---------|-----|------------|-----------|
|           |         |     | right foot | left foot |
| T1        | 1       | 1   | 1.75       | 1.83      |
|           |         | 7   | 1.78       | 1.90      |
|           |         | 13  | 1.90       | 2.00      |
|           |         | 19  | 1.93       | 1.90      |
|           |         | 25  | 1.65       | 1.68      |
|           |         | 36  | 2.23       | 2.43      |
|           |         | 42  | 2.00       | 1.98      |
|           |         | 48  | 2.05       | 2.03      |
|           |         | 54  | 1.63       | 1.75      |
|           |         | 60  | 1.73       | 1.80      |
| T2        | 2       | 2   | 1.38       | 1.50      |
|           |         | 8   | 1.75       | 1.85      |
|           |         | 14  | 1.65       | 1.58      |
|           |         | 20  | 1.75       | 1.70      |
|           |         | 26  | 1.78       | 1.80      |
|           |         | 35  | 2.75       | 2.68      |
|           |         | 41  | 2.23       | 2.18      |
|           |         | 47  | 2.33       | 2.33      |
|           |         | 53  | 2.25       | 2.30      |
| T3        | 3       | 59  | 1.65       | 1.45      |
|           |         | 3   | 1.75       | 1.83      |
|           |         | 9   | 1.95       | 2.05      |
|           |         | 15  | 2.23       | 2.35      |
|           |         | 21  | 1.75       | 1.93      |
|           |         | 27  | 1.85       | 1.90      |
|           |         | 34  | 2.20       | 2.25      |
|           |         | 40  | 2.35       | 2.43      |
|           |         | 46  | 2.20       | 2.08      |
|           |         | 52  | 2.18       | 2.08      |
|           |         | 58  | 1.55       | 1.50      |

| Treatment | Tr. No. | Box | Evaluation |           |
|-----------|---------|-----|------------|-----------|
|           |         |     | right foot | left foot |
| T4        | 4       | 4   | 1.78       | 1.80      |
|           |         | 10  | 2.08       | 2.08      |
|           |         | 16  | 1.68       | 1.70      |
|           |         | 22  | 1.80       | 1.93      |
|           |         | 28  | 1.75       | 1.90      |
|           |         | 33  | 2.05       | 2.23      |
|           |         | 39  | 2.50       | 2.35      |
|           |         | 45  | 2.25       | 2.18      |
|           |         | 51  | 2.05       | 2.10      |
|           |         | 57  | 2.23       | 2.33      |
| T5        | 5       | 5   | 1.80       | 1.73      |
|           |         | 11  | 1.78       | 1.80      |
|           |         | 17  | 1.78       | 1.98      |
|           |         | 23  | 1.95       | 1.98      |
|           |         | 29  | 1.80       | 1.98      |
|           |         | 32  | 2.05       | 2.38      |
|           |         | 38  | 1.90       | 1.98      |
|           |         | 44  | 2.28       | 2.23      |
|           |         | 50  | 2.60       | 2.63      |
|           |         | 56  | 1.88       | 1.98      |
| T6        | 6       | 6   | 1.93       | 1.88      |
|           |         | 12  | 1.65       | 1.68      |
|           |         | 18  | 1.73       | 1.80      |
|           |         | 24  | 1.93       | 2.03      |
|           |         | 30  | 1.85       | 1.98      |
|           |         | 31  | 2.28       | 2.38      |
|           |         | 37  | 2.58       | 2.48      |
|           |         | 43  | 1.83       | 1.88      |
|           |         | 49  | 1.90       | 1.93      |
|           |         | 55  | 1.95       | 1.95      |