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Verification and validation of the effectiveness of the biological additive PGE Biogrowth regarding the increase of weight gain in bulls.

Verification of the effect of feed additive: PGE Biogrowth on the weight gain of bulls. The trial was conducted at the high school in Olomouc (Czech Republic) under the supervision of University Prof. Dr. Anthony Novak. Results are stated on page 8 and following

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Introduction

The preparation of agricultural products without the use of chemical agents is becoming increasingly important. As a result, different substances of natural origin are in the foreground of traditional and ecological agriculture. Products target: animal growth , added benefit of improved feed usage, improving in-house environments , or increase the plant earnings.

I have focused on determining whether environmentally friendly feed additive (PGE Biogrowth) of purely natural origin show an influence on the growth of test bulls.

At the start of 2010 I started in cooperation with Mr. Doz. Dipl. Ing. Antonin Novak, Csc., which was mediated by our Biology-and Ecology teacher Dipl. Ing. Tomáš Kostka. Professor Novák asked us for further cooperation, which would be related to the conduct of the experiment (experiment realization) with respect to the effect of the preparation PGE BIOGROWTH.

The preparation PGE BIOGROWTH Brochures of Project Global Enterprise
Effect of the application of the natural extract – Substance PGE BIOGROWTH: ¹

After a meeting with my supervisor I accepted the cooperation.

I have set myself the following as the main goal:

- Obtaining results that characterise the weight gain of test bulls after application of the additive: PGE BIOGROWTH.

According to the statement by the representative of PGE, the preparation PGE BIOGROWTH in the Czech Republic has never been tested systematically under conditions of agricultural holdings.

The experiments were only carried out with other economic animals or other animal categories such as - pigs, chickens, broilers, ducks, geese, sheep, piglets, calves.²

1. METHODOLOGY

In the time period of 1.4. 2010 to 31.5.2010 I conducted the feed experiment (Experiment Nr. 1), where the additive PGE BIOGROWTH was combined with the feed of the test bulls (bulls group "W"). "Control Bulls group" did not receive the feed additive (bulls group "K")

¹ Information taken from the promotional material of PGE (see Attachment Nr.1)

² NOVÁK, A. *Biologické krmivové přísady*. Olomouc, 2010. 45.

Thereafter, the bulls of both groups were weighed and their increases within the investigation period were aggregated. Due to the weight gain comparison of bulls from two groups and subsequent analysis I have examined whether PGE BIOGROWTH influenced the weight gain of the experimental bulls in group "W".

The experiment was repeated in the time period of 1.9.2010 to 31.10.2010 (Experiment Nr.2).

1.1. Experiment conditions

1.1.1. Description of the Stable and the Boxes

The stable for my observation was selected according to the following criterion :

- The possibility to create independent groups of experimental bulls with the weight of about 200 kg and 400 kg in the stable.

The breeding stable for young cattle ("Zuchtstall Junges Viech", ZJV), located on a private farm "Landgut Kralitz" in Kralitz in Hanna absolutely meets those requirements.

Floor Plan of the stables(scheme)

Box 1 / Box 2

Strewn(scattered?) part of the box

Not strewn(unscattered, unstrewn?) part of the box

Feed alley

Stable – interior dimensions:

Stable length: 86,5m

Stable width: 9,5m

Stable height: 2,8m

No. Boxes: 16

Number tested boxes throughout whole experiment period: 2

Box 1 in the stable compartment 7 – bulls with lower average weight

Box 2 in the stable compartment 7 – bulls with higher average weight

Box – Dimensions and Description

Box width: 5,4m

Box length: 6,5m

The barn compartment is divided lengthwise in half in a scattered and unscattered part. A feed pump (Water Bowl / institution) is placed on a barrier(holdings) for each box.

Microclimate values - Stables

Average Temperature:	Experiment Nr.1	8°C
	Experiment Nr.2	20°C

Average relative moisture content:	Experiment Nr.1	65%
	Experiment Nr.2	65%

For the bull feeding in the stable enough light has been secured and there were no drafts.

1.1.2.Feed Technology

The bulls were fed twice daily once at 5.00 am and again at 5.00 pm. The food was made available for the Bulls with the feed vehicle FARESIN TMR 500 with a horizontal mixing (horizontal circulation).

The feed ration had the following composition during the whole experiment period:

- corn silage
- haylage
- beet pulp
- Hay and haylage mixed 50:50

All bulls received the same amount of feed throughout the experimental period, i.e. 138 kg per box in the morning and 138 kg per box evenings. This results in 19.71kg of feed available per bull at each feeding time. The mentioned amount of feed corresponds to the ration 39.42 Kg feed per bull per day. The feed rations mentioned had feed intake secured ad libitum in both observed weight categories.

1.2. Experiment realisation

1.2.1.Time allocation for the experiments

The first experiment was conducted in the time period 31.3.2010 to 31.5.2010.

On 31.3.2010 I weighed the cops and then divided them by weight and breed accordingly. Thus, two groups of seven bulls with the average weight of 217.43 kg (E1 /K/1) and 350.54 Kg (E1/K/2) were established. Their weights are just a starting condition to calculate their weight gain.

These bulls have been a part of the control group, which were not fed with additive PGE BIOGROWTH. The bulls were again weighed on 30.4.2010 and the weight recorded so to calculate the average weight gain of the group.

On 30.4.2010 I weighed the cops and then divided them by weight and breed accordingly. Thus, two groups of seven bulls with the average weight of 231.43 kg (E1 /K/1) and 425.86 Kg (E1/K/2) were established. Their weights are just a starting condition to calculate their weight gain.

These bulls were fed with additive PGE BIOGROWTH. They were again weighed on 31.5.2010 and these weights are the final state to calculate the weight gain.

The second experiment was conducted in the time period 31.8.2010 to 31.10.2010.

On 31.8.2010 I weighed the cops and then divided them by weight and breed accordingly. Thus, two groups of seven bulls with the average weight of 193.43 kg (E1 /K/1)³ and 380 Kg (E1/K/2)⁴ were established. The weights stated above are the initial weight of the bulls.

These bulls have been a part of the control group, which were not fed with additive PGE

These bulls have been a part of the control group, which were not fed with additive PGE BIOGROWTH . The bulls were again weighed on 30.9.2010 and the weight recorded so to calculate the average weight gain of the group.

On 30.9.2010 I weighed the cops and then divided them by weight and breed accordingly. Thus, two groups of seven bulls with the average weight of 233.43 kg (E1 /K/1)³ and 423.43 Kg (E1/K/2)⁴ were established. The weights stated above are the initial weight of the bulls.

These bulls were fed with additive PGE BIOGROWTH. The bulls were again weighed on 31.10.2010 and the weight recorded so to calculate the average weight gain of the group.

1.2.2.Characteristics of the chosen bulls and signature (Marking, labelling) of the bull groups

For the experiments I selected the bulls in the groups as such so that I can take various feeding phases. In each stall compartment 7 bulls were housed. To eliminate the influence of the species of the bulls on the weight gain in the experiments, identical species were placed in each box: 5 bulls of the breed " The Czech Fleckvieh " and 2 bulls of the breed " The Holstein cattle."

The bull groups are marked as follows:

E1/K/1	1.Experiment	Control group without PGE Biogrowth - Bulls with lower average weight
E1/W/2	1.Experiment	Test group with PGE Biogrowth - Bulls with lower average weight
E1/K/2	1.Experiment	Control group without PGE Biogrowth - Bulls with higher average weight
E1/W/1	1.Experiment	Test group with PGE Biogrowth - Bulls with higher average weight

1.2.3.Application Methodology of PGE BIOGROWTH

The recommended dose, as set by PGE, is 330g of the additive PGE BIOGROWTH per 1 tonne of dry feed.

Calculation of the dosage for my experiment:

- 330 g of PGE BIOGROWTH . 1 T⁻¹ of Forage dry matter
- Actual dry matter in 1 T of feed is 35%
- $330 \cdot 0,35 = 115,5$ g of the preparation per 1 T raw feed
- $FR^3 = 138$ Kg – 13,8% of 1 T
- $115,5 \cdot 0,138 = 15,939 = 16$ g

In 1 litre of water, I dissolved 16 grams PGE BIOGROWTH .

The substance was administered in the form of a dilute solution (16 g per 1 L PGE BIOGROWTH water). The solution was applied / administered by a nebulizer to the feed ration and then this was mixed into the feed ration.

1.2.4.Weighing of the bulls

The animals were weighed so to determine their weight gain. One can either weigh all bulls for low numbers or only certain individuals for higher numbers.

With respect to smaller number of bulls we decided to weigh each animal individually.

At the end of each experiment we weighed the bulls on a livestock scale. The balance stood on a solid horizontal surface, was thoroughly cleaned of feces and other contaminants and zeroed correctly.

³ FR = Feed Ration

1.2.5. Calculation of the weight gain

The main value observed was the weight gain of the bulls.

The calculation method of weight gain is as follows:

- After each weighing a deduction (5 %) to the feeding was carried out
- The net weights were entered in the tables 1-4 and 6-9

$$\text{Final weight} - \text{initial weight}$$

$$\text{Weight gain of first animal/kg} = \frac{\text{Final weight} - \text{initial weight}}{\text{Number days in the time period}}$$

- The calculated weight gains were entered in the tables 1 – 4 and 6 - 9 and further processed statistically

2. RESULTS

As mentioned above the following was set as the main goal:

- Achieving new results regarding the weight gain increase of bulls after application of the additive PGE BIOGROWTH.

The first experiment (was conducted in the time period 31.3.2010 to 31.5.2010)

The control group – **E1/K/1**

Table Nr.1

Animal No.	Racial affiliation	Net weight 31.3.2010 (Kg)	Net weight 30.4.2010 (Kg)	Daily weight gain (Kg)
580711-071	C100	195,5	210	0,483
580712-071	C100	205	224	0,633

580707-071	H100	195,5	205,25	0,325
580710-071	H100	181,5	219,5	1,266

580720-071	C100	181,5	205,25	0,792
580718-071	C100	200,5	229	0,950
580721-071	C100	205	228,75	0,792

The average daily weight gain of the whole group **E1/K/1** was 0,794 Kg.

The control group – **E1/K/2**

Table Nr.2

Animal No.	Racial affiliation	Net weight 31.3.2010 (Kg)	Net weight 30.4.2010 (Kg)	Daily weight gain (Kg)
563618-071	C100	376,25	400	0,792
563620-071	C100	381	414,25	1,108
563621-071	H100	414	428,25	0,475
580690-071	H100	400	428,5	0,950
580692-071	C100	376,5	405	0,950
563624-071	C100	348,25	376,75	0,950
580703-071	C100	355	372	0,566

The average daily weight gain of the whole group **E1/K/2** was 0,827 Kg.

The test group that was fed with the additive PGE BIOGROWTH – **E1/W/1**

Table Nr.3

Animal No.	Racial affiliation	Net weight 31.3.2010 (Kg)	Net weight 30.4.2010 (Kg)	Daily weight gain (Kg)
580711-071	C100	190	223,25	1,073
580712-071	C100	209	242,25	1,073
580707-071	H100	175,75	204,25	0,919
580710-071	H100	199,5	237,5	1,226
580720-071	C100	185,25	218,5	1,073
580718-071	C100	209	247	1,236
580721-071	C100	213,75	247	1,073

The average daily weight gain of the whole group **E1/W/1** was 1,096 Kg.

The test group that was fed with the additive PGE BIOGROWTH – **E1/W/2**

Table Nr.4

Animal No.	Racial affiliation	Net weight 31.3.2010 (Kg)	Net weight 30.4.2010 (Kg)	Daily weight gain (Kg)
563618-071	C100	380	418	1,236

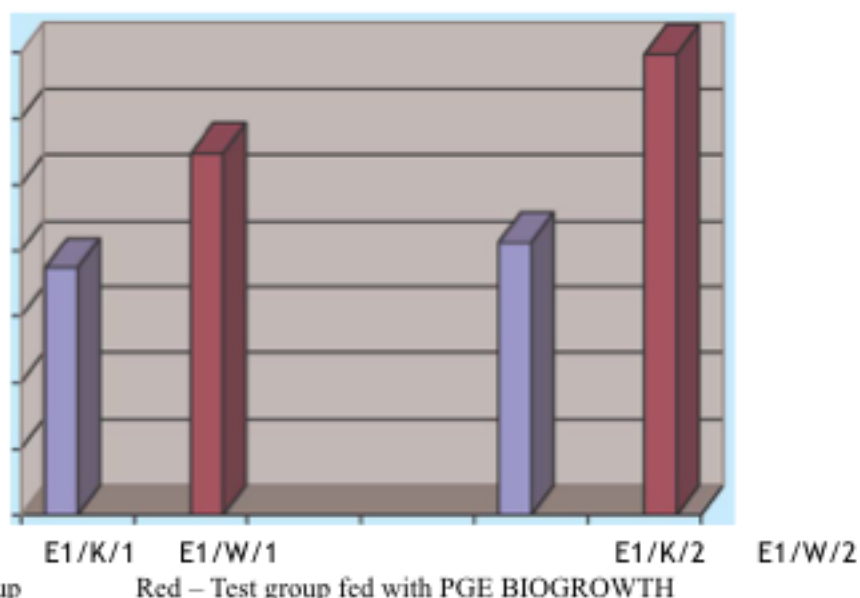
563620-071	C100	394,25	437	1,379
563621-071	H100	413,25	456	1,379
580690-071	H100	408,5	451,25	1,379
580692-071	C100	380	427,5	1,532
563624-071	C100	356,75	389,5	1,165
580703-071	C100	342	394,25	1,685

The average daily weight gain of the whole group **E1/W/2** was 1,394 Kg.

The following graph (Graph Nr. 1) displays the average daily weight gains of all four bull groups in the first experiment:

Experiment Nr.1

Graph Nr.1



The difference in weight gain in the bulls with lower average weight, which was influenced by the additive PGE BIOGROWTH is 0.347 Kg.

The difference in weight gain in the bulls with higher average weight, which was influenced by the additive PGE BIOGROWTH is 0.567 Kg.

The primary statistical characteristics of weight gains of all four bull groups were entered in Table Nr. 5:

Experiment Nr.1 – Statistical Characteristics

Table Nr.5

Statistical Characteristics	E1/K/1	E1/W/1	E1/K/2	E1/W/2
Mean - váš. forma	0,749	1,096	0,827	1,394

Statistical Characteristics of Experiment Nr. 1				
Mean - váš. forma	0,749	1,096	0,827	1,394

Average absolute deviation- váš. forma	0,55	0,11	0,19	0,12
Dispersion - váš. forma	0,08	0,01	0,05	0,03
Standard deviation	0,28	0,10	0,21	0,20
Fluctuation range	0,94	0,32	0,63	0,52
Coefficient of variation	0,07	0,19	0,26	0,13

The lower values of the average absolute deviation , the dispersion, the standard deviation and the fluctuation range between the weight gains of the Bull groups E1/K/1 and E1/W/1 and also the Bull groups E1/K/2, and E1/W/2 indicate that the preparation PGE BIOGROWTH promotes to stability of balanced weight gain of the bulls.

The second experiment (conducted in the time period 31.8.2010 to 31.10.2010)

The control group – E2/K/1

Table Nr.6

Animal No.	Racial affiliation	Net weight 31.3.2010 (Kg)	Net weight 30.4.2010 (Kg)	Daily weight gain (Kg)
580732-071	C100	156,75	180,5	0,792
580731-071	C100	190	218,5	0,950
580730-071	H100	175,75	199,5	0,792
580726-071	C100	194,75	232,75	1,267
580728-071	H100	156,75	180,5	0,793
580734-071	C100	152	171	0,633
580733-071	C100	147,25	171	0,792

The average daily weight gain of the whole group E2/K/1 was 0,860 Kg.

The control group – E2/K/2

Table Nr.7

Animal No.	Racial affiliation	Net weight 31.3.2010 (Kg)	Net weight 30.4.2010 (Kg)	Daily weight gain (Kg)
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580714-071	C100	342	380	1,267
580712-071	C100	351,5	380	0,950
580716-071	H100	361	399	1,267
580715-071	H100	356,25	389,5	1,113
580729-071	C100	227,25	261	0,792

580720-071	C100	337,25	361	0,792
580718-071	C100	351,5	380	0,950
580721-071	C100	351,5	370,5	0,633

The average daily weight gain of the whole group **E2/K/2** was 0,996 Kg.

The test group that was fed with the additive PGE BIOGROWTH – **E2/W/1**

Table Nr.8

Animal No.	Racial affiliation	Net weight 31.3.2010 (Kg)	Net weight 30.4.2010 (Kg)	Daily weight gain (Kg)
580732-071	C100	180,5	209	0,924
580731-071	C100	218,5	266	1,532
580730-071	H100	199,5	228	0,924
580726-071	C100	232,75	280,25	1,532
580728-071	H100	180,5	223,25	1,410
580734-071	C100	171	213,75	1,410
580733-071	C100	171	213,75	1,410

The average daily weight gain of the whole group **E2/W/1** was 1,306 Kg.

The test group that was fed with the additive PGE BIOGROWTH – **E2/W/2**

Table Nr.9

Animal No.	Racial affiliation	Net weight 31.3.2010 (Kg)	Net weight 30.4.2010 (Kg)	Daily weight gain (Kg)
580714-071	C100	380	418	1,231
580712-071	C100	380	413,25	1,131
580716-071	H100	399	437	1,231
580715-071	H100	389,5	446,5	1,841
580720-071	C100	361	403,75	1,480
580718-071	C100	380	427,5	1,532
580721-071	C100	370,5	418	1,532

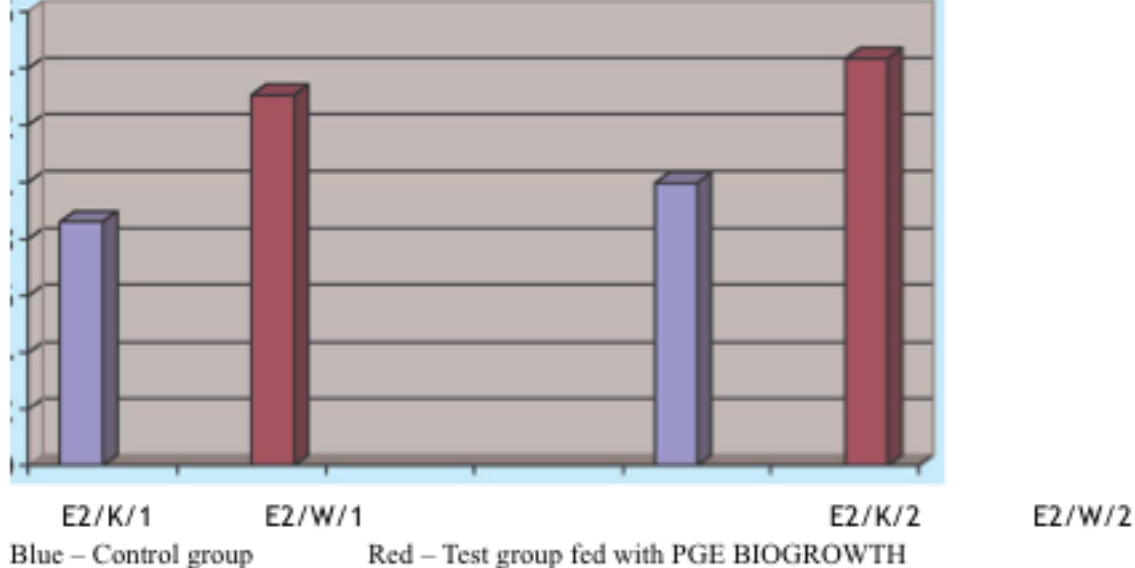
The average daily weight gain of the whole group **E1/W/2** was 1,434 Kg.

The following graph (Graph Nr. 1) displays the average daily weight gains of all four bull groups in the second experiment:

Experiment Nr.2

Graph Nr.2





The difference in weight gain in the bulls with lower average weight, which was influenced by the additive PGE BIOGROWTH is 0.446 Kg.

The difference in weight gain in the bulls with higher average weight, which was influenced by the additive PGE BIOGROWTH is 0.438 Kg.

The primary statistical characteristics of weight gains of all four bull groups in the second experiment were entered in Table Nr.10:

Experiment Nr.2 – Statistical Characteristics

Table Nr.10

Statistical Characteristics	E2/K/1	E2/W/1	E2/K/2	E2/W/2
Statistical Characteristics of Experiment Nr. 2				
Mean - váš. forma	0,860	1,306	0,996	1,434
Average absolute deviation- váš. forma	0,14	0,21	0,18	0,19
Dispersion - váš. forma	0,03	0,06	0,49	0,05
Standard deviation	0,18	0,24	0,22	0,22
Fluctuation range	0,63	0,60	0,63	0,71
Coefficient of variation	0,21	0,18	0,22	0,15

Expert guarantor:

Prof. Dr. Antonín Novák

