ISSN 1313 - 8820
Volume 2, Number 4
December 2010

# AGRICULTURAL SCIENCE AND TECHNOLOGY

2010

An International Journal Published by Faculty of Agriculture,
Trakia University, Stara Zagora, Bulgaria

**Scope and policy of the journal**
Agricultural Science and Technology /AST/ – an International Scientific Journal of Agricultural and Technology Sciences is published in English in one volume of 4 issues per year, as a printed journal and in electronic form. The policy of the journal is to publish original papers, reviews and short communications covering the aspects of agriculture related with life sciences and modern technologies. It will offer opportunities to address the global needs relating to food and environment, health, exploit the technology to provide innovative products and sustainable development. Papers will be considered in aspects of both fundamental and applied science in the areas of Genetics and Breeding, Nutrition and Physiology, Production Systems, Agriculture and Environment and Product Quality and Safety. Other categories closely related to the above topics could be considered by the editors. The detailed information of the journal is available at the website. Proceedings of scientific meetings and conference reports will be considered for special issues.

**Submission of Manuscripts**
All manuscript written in English should be submitted as MS-Word file attachments via e-mail to ascitech@uni-sz.bg. Manuscripts must be prepared strictly in accordance with the detailed instructions for authors at the website
http://www.uni-sz.bg/ascitech/index.html
and the instructions on the last page of the journal. For each manuscript the signatures of all authors are needed confirming their consent to publish it and to nominate on author for correspondence. They have to be presented by a submission letter signed by all authors. The form of the submission letter is available upon from request from the Technical Assistance or could be downloaded from the website of the journal. All manuscripts are subject to editorial review and the editors reserve the right to improve style and return the paper for rewriting to the authors, if necessary. The editorial board reserves rights to reject manuscripts based on priorities and space availability in the journal.

**Subscriptions**
Agricultural Science and Technology is published four times a year. The subscription price for institutions is 80 € and for personal subscription 30 € which include electronic access and delivery. Subscription run for full calendar year. Orders, which must be accompanied by payment may be sent direct to the publisher:

Trakia University
Faculty of Agriculture, Bank account:
UniCredit Bulbank,
Sofia BIC: UNCRBGSF

IBAN: BG29UNCR76303100117681
With UniCredit Bulbank Stara Zagora

**Internet Access**
This journal is included in the Trakia University Journals online Service which can be found at www.uni-sz.bg.



**Address of Editorial office**:
Agricultural Science and Technology
Faculty of Agriculture, Trakia University
Student's campus, 6000 Stara Zagora
Bulgaria
Telephone.: +359 42 699330
+359 42 699446
http://www.uni-sz.bg/ascitech/index.html

**Technical Assistance:**
Nely Tzvetanova
Telephone.: +359 42 699446
E-mail: ascitech@uni-sz.bg

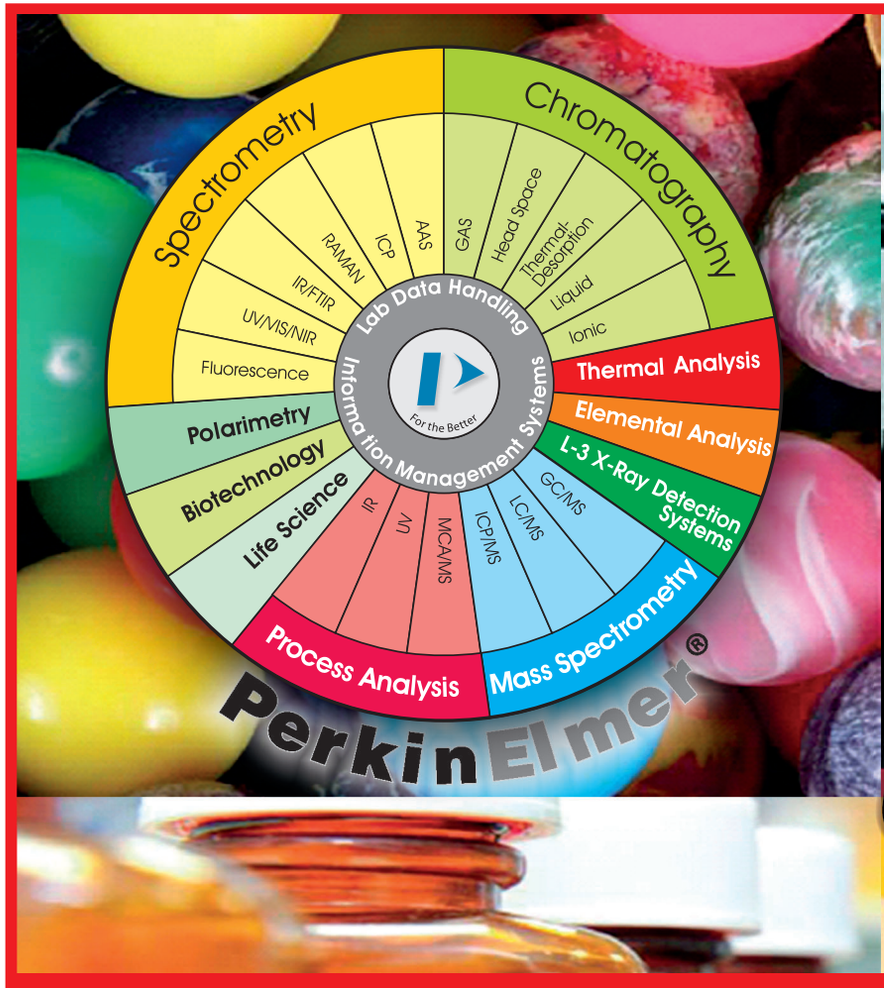
ISSN 1313 - 8820

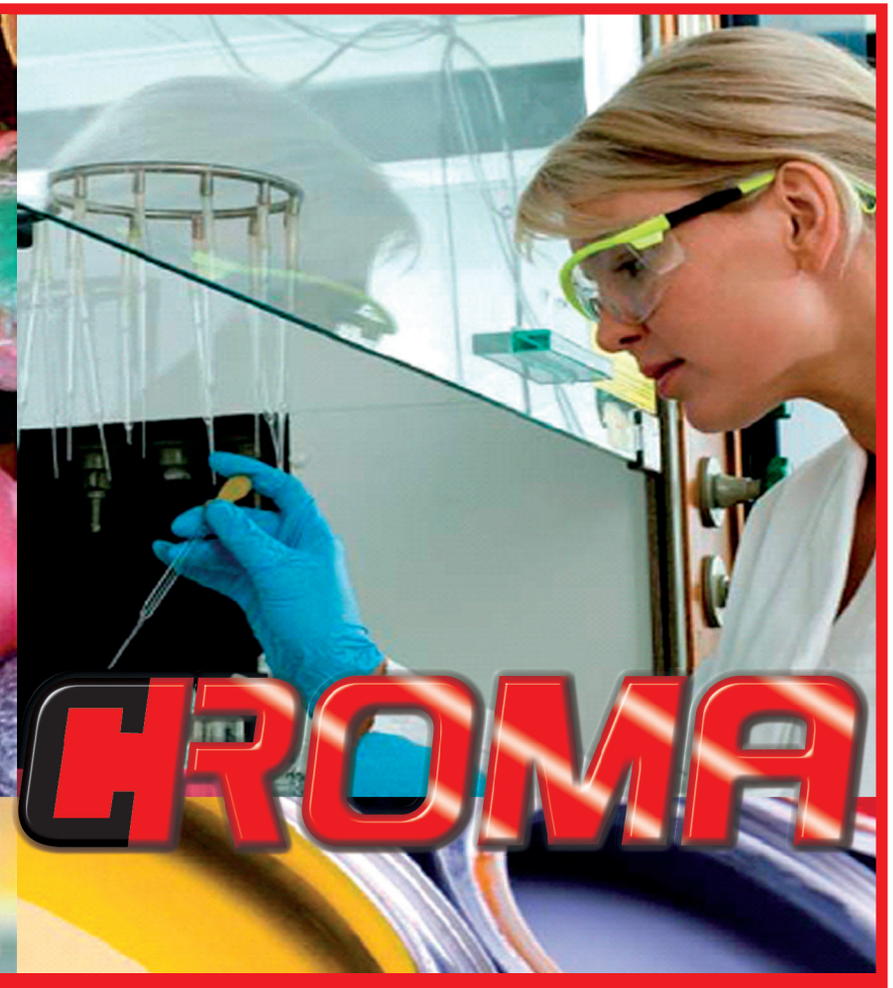
Volume 2, Number 4
December 2010


# AGRICULTURAL SCIENCE AND TECHNOLOGY

2010

An International Journal Published by Faculty of Agriculture,
Trakia University, Stara Zagora, Bulgaria




***Да работим заедно...***
***... за да ви осигурим качествено търговско посредничество***
***... за да ви осигурим по-богат избор инструменти в повече области ...***
***за да ви осигурим високо-квалифицирано сервизно обслужване***

**ХРОМА ООД • София 1784, Младост 1, бул. Андрей Сахаров 14Б • тел.: (02) 952 0301, (02) 952 6293, факс: (02) 952 3784**
**e-mail: chroma@spnet.net, www.chroma-bg.com**

AGRICULTURAL SCIENCE AND TECHNOLOGY, VOL. 2, No 4, pp 197 - 201, 2010

# Effect of addition of multienzyme preparation *VemoZyme®Plus* on productive and slaughter parameters and meat composition of broiler chickens, fed wheat-corn-soybean meal diets

V. Georgieva*[1], S. Chobanova[1], G. Ganchev[1], I. Manolov[2], D. Jarkov[3], M. Lalev[4], D. Stoianov[5]

[1]Department of Morphology, Phisiology and Animal nutrition, Faculty of Agriculture, Trakia University, 6000 Stara Zagora, Bulgaria.
[2]Department of Genetics, Breeding and Animal reproduction, Faculty of Agriculture, Trakia University, 6000 Stara Zagora, Bulgaria.
[3]Department of General Husbandry,Faculty of Veterinary Medicine, Trakia University, 6000 Stara Zagora, Bulgaria.
[4]Institute of Agriculture, 6000 Stara Zagora, Bulgaria.
[5]Zoohrankonsult, Bulgaria

***Abstract.*** *An experiment, lasting 42 days, was made to stady the effect of addition of Bulgarian multienzyme complex VemoZyme®Plus on productive and slaughter performance and chemical meat composition of broiler chickens, fed wheat-corn-soybean meal based diets. In this trial 120 male one day old chickens of „Ross 308" hybrid, keep in battery cages, divided into 4 groups (distributed equally in three repetitions in each group) were used: 1. Positive control, fed with balanced diet ; 2. Positive control with addition of 0,05 % VemoZyme®Plus. 3. Negative control, fed with diet, contains 5 % less metabolizable energy(ME) and digestible essential amino acids (DEAA)–lisine, methionine+cistine, treonine. 4. Negative control with addition of 0.05% by VemoZyme®Plus. Tested enzyme preparation had no significant effect on the live weight, feed conversion, slaughter indices, protein and fat composition in the white meat of broiler chickens, fed with balanced diets. Addition of VemoZyme ® Plus to the diets of diminished nutritive value, increases (compared to the same, without addition of VemoZyme ® Plus) with 8,0 (P<0.05) and 5.7% (P<0.05) live weight, respectively through the grower and whole 42 days period, improved feed conversion with 11,0 (P<0,05) and 4,7 % (P>0,05) respectively through the grower and the whole fattening period, has a positive (P<0,05) effect on grill weight (with 6,5 %), without significantly affecting percentage of protein and fat in the white meat, compared with the control group.*

**Keywords:** broilers, productive indeces, enzyme, wheat-corn- soybean meal diet, carcass parameters, meat composition

**Abbreviations:** AME– apparent metabolizable energy , DEAA – digestible essential aminoacids , ME – metabolizable energy, NSPs – Non-Starch Polyzaccharides

## Introduction

Feeding enzymes in poultry is one of the major nutritional advances in the last fifty years. The benefits of using enzymes as feeding additives in poultry diets include not only enhanced bird performance, digestibility and utilization of nutrients, but also less environmental and ecological problems. A serious achievement in the field of the feeding enzymes is developing of multienzymes preparations, containing combination of different enzymes, considered with the component contents of compound feeds. In this connection, the enzymes, recommended about diets with high participation of wheat and soybean meal, take a peculiar interest, as the last are basic components in the broilers' diets. There are potential problems in the utilization of high percent of wheat in the diets (Georgieva et al., 1997; McNab, 1996; Mathlouthi et al., 2002; Choct et al., 2009), especially for young birds, which is connected with the content of indigestible carbohydrates fractions – Non-Starch Polysaccharides (NSPs), basically pentosans and less glucans. Poultry don't produce enzymes for the hydrolysis of NSPs, present in the cell wall of the grains and they remain un-hydrolyzed. The intestinal viscosity, caused by water-soluble NSPs, dramatically reduces bird production (Choct and Annison, 1992b; Ward, 1995; Georgieva et al., 1997; Mathlouthi et al., 2002 ). The content of NSPs in the diet is inversely related to the apparent metabolizable energy (AME) of wheat (Annison, 1991) and positively correlated with gut viscosity (Bedford et al., 1991; Bedford and Classen, 1992). Gut viscosity is inversely related to nutrient utilization and bird performance (Bedford et al., 1991; Annison, 1992; Bedford and Classen, 1992). The wheat contents substances (inhibitors), suppress the enzyme activity of α-amilase, which is important about the digestibility of the starch. The investigation of Choct and Annison (1992a) demonstrated that the concentration of soluble arabinoxylan in broiler diets is positively correlated with the relative depression in AME, nitrogen retention, feed-conversion efficiency, and weight gain. Wheat diets containing 4% arabinoxylans decreased digestibility of starch, protein, and lipids by 14.6, 18.7, and 25.8%, respectively. One of the reasons about the low content of metabolizable energy in the soybean meal is the presence of indigestible olygosaccharides in its content (bigger part of α-d-galactosides). These substances influence negatively on the digestibility of nutrients in the diet. Bi Yu and Chung (2004) expressed an opinion that supplementing with 3% reduction ME corn-soybean meal-based diets to broilers with NSPs-degrading enzymes (α-amilase, β-glucanase, xylanase) potentially improved the utilization of soybean meal, allowed full restoration of growth performance, comparable to adequate energy positive control.

The aim of the present study is to investigate the effect of the addition of Bulgarian polyenzyme preparation *Vemozyme® Plus* in wheat-corn-soybean meal diets on productive parameters of broilers.

* e-mail: georgieva_vili@yahoo.com

## Material and methods

*Vemozyme® Plus* is a complex enzyme preparation, produced by „Vemo 99" – Bulgaria, with a wide range of action, containing the enzymes: xylanase, cellulase, β-gluconase, lipase, α-galactosidase, utilized about compound feeds for nonruminant animals, with higher participation of wheat, barley, triticale, soybean meal, sunflower oil meal and others. For realization of the aim, it was made scientific experiment in Trakia University, Stara Zagora. The present study was conducted with total 120 male one day old „Ross 308" broiler chickens, keep in battery cages, divided into 4 groups, each comprising 30 chicks, distributed equally in three repetitions. The chickens were brought up in controlled microclimatic conditions, according to the requirements of the hybrid "Ross 308". Feed and water were supplied *ad libitum.* In 42 days fattening period, it was controlled individually the live weight of the chickens, aged 10, 28 and 42 days and the consumption of feed in subgroups, about the relevant age periods. In the end of the experiment, 4 chickens of mean live weight from each group were separated, it was made slaughter analysis on them and average samples were taken for analysis the chemical composition of the meat samples of the breast. The obtained data were statistically processed via ANOVA, Statistica 06 for t-test significance of the differences.

The composition and feeding value of the used compound feeds are presented in Table 1, and the results about weight development of the chickens, feed conversion, slaughter and chemical analysis (AOAC, 1990) of the white meat in Tables 2, 3 and 4 respectively. Starter, grower and finisher diets for control group and 1-st experimental one were formulated according to the requirements of

**Table 1.** Composition of the compound feed, %

| | Groups | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Starter | | | | Grouer | | | | Finisher | | | |
| | I | II | III | IV | I | II | III | IV | I | II | III | IV |
| Components | Control 100%ME 100% DEAA | Experimental 100%ME 100% DEAA + 0,05% Vemozyme | Experimental 95%ME 95% DEAA | Experimental 95%ME 95% DEAA + 0,05% Vemozyme | Control 100%ME 100% DEAA | Experimental 100%ME 100% DEAA + 0,05% Vemozyme | Experimental 95%ME 95% DEAA | Experimental 95%ME 95% DEAA + 0,05% Vemozyme | Control 100%ME 100% DEAA | Experimental 100%ME 100% DEAA + 0,05% Vemozyme | Experimental 95%ME 95% DEAA | Experimental 95%ME 95% DEAA + 0,05% Vemozyme |
| Maize | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 |
| Wheat | 27.4 | 27.4 | 31.66 | 31.66 | 27.04 | 27.04 | 30.92 | 30.92 | 39.66 | 39.66 | 43.61 | 43.61 |
| Sunflower expeller | 5 | 5 | 5.0 | 5.0 | 5 | 5 | 5 | 5 | 5.0 | 5.0 | 5.0 | 5.0 |
| Fish meal | 4.0 | 4.0 | 4.0 | 4.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| Sunflower oil | 6.8 | 6.8 | 3.5 | 3.5 | 8.5 | 8.5 | 5.6 | 5.6 | 5.7 | 5.7 | 2.6 | 2.6 |
| L-lysine | 0.28 | 0.28 | 0.22 | 0.22 | 0.12 | 0.12 | 0.07 | 0.07 | 0.15 | 0.15 | 0.10 | 0.10 |
| DL-methionine | 0.35 | 0.35 | 0.29 | 0.29 | 0.27 | 0.27 | 0.22 | 0.22 | 0.21 | 0.21 | 0.16 | 0.16 |
| Treonine | 0.14 | 0.14 | 0.11 | 0.11 | 0.07 | 0.07 | 0.03 | 0.03 | 0.08 | 0.08 | 0.05 | 0.05 |
| Salt | 0.30 | 0.30 | 0.30 | 0.30 | 0.27 | 0.27 | 0.27 | 0.27 | 0.30 | 0.30 | 0.30 | 0.30 |
| Limestone | 0.79 | 0.79 | 0.82 | 0.82 | 0.63 | 0.63 | 0.63 | 0.63 | 0.75 | 0.75 | 0.78 | 0.78 |
| Dicalcium phosphate | 1.95 | 1.95 | 1.90 | 1.90 | 1.8 | 1.8 | 1.76 | 1.76 | 1.45 | 1.45 | 1.40 | 1.40 |
| VMPremix | 0.20 | 0.20 | 0.20 | 0.20 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 |
| Calculated analysis, % | | | | | | | | | | | | |
| Crude protein | 22.0 | 22.0 | 22.0 | 22.0 | 21.0 | 21.0 | 21.0 | 21.0 | 19.0 | 19.0 | 19.0 | 19.0 |
| Dig. Lysine | 1.27 | 1.27 | 1.21 | 1.21 | 1.10 | 1.10 | 1.05 | 1.05 | 0.97 | 0.97 | 0.92 | 0.92 |
| Dig. M + C | 0.94 | 0.94 | 0.89 | 0.89 | 0.84 | 0.84 | 0.80 | 0.80 | 0.76 | 0.76 | 0.72 | 0.72 |
| Dig. Treonine | 0.83 | 0.83 | 0.79 | 0.79 | 0.73 | 0.73 | 0.69 | 0.69 | 0.65 | 0.65 | 0.62 | 0.62 |
| Dig.Triptofane | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.20 | 0.20 | 0.20 | 0.20 |
| Calcium | 1.05 | 1.05 | 1.05 | 1.05 | 0.90 | 0.90 | 0.90 | 0.90 | 0.85 | 0.85 | 0.85 | 0.85 |
| Crude fibres | 4.3 | 4.3 | 4.4 | 4.4 | 4.3 | 4.3 | 4.4 | 4.4 | 4.0 | 4.0 | 4.1 | 4.1 |
| Available Phosphorus | 0.50 | 0.50 | 0.50 | 0.50 | 0.45 | 0.45 | 0.45 | 0.45 | 0.42 | 0.42 | 0.42 | 0.42 |
| ME, MJ/kg | 13.4 | 13.4 | 12.6 | 12.6 | 13.7 | 13.7 | 13.1 | 13.1 | 13.4 | 13.4 | 12.7 | 12.7 |

„Ross 308", and these ones for 1-st experimental group were enriched with 0,05% *Vemozyme® Plus.* About better account of the effect from added multienzyme preparation, the diets of 3-rd and 4-th experimental groups contained 5% less metabolizable energy (ME) and digestible essential amino acids (DEAA), compared to the control one, and 0,05% *Vemozyme® Plus* was added in the diet of 4-th experimental group.

## Results and discussion

In Table 2, the results from weight development of the chickens are presented, and in Table 3 – the data about the feed efficiency. The feeding with enriched with 0,05% *Vemozyme® Plus* balanced diets for the chickens from 2-nd group, didn't influence significantly the live weight of throughout the fattening period. At age 42 days, chickens from the 2-nd group have the same body weight (2714 g), compared to these from the control one (without *VemoZyme® Plus*)-2693. The chickens from 3-rd experimental group (negative control), obtaining the diet with 5 % decreased contents of ME and DEAA reached 8,1% (P< 0,05), 10,3% (P< 0,05) and 7,6% (P>0,05) lower live weight, compared to 1-st group, respectively at 10, 28 and 42 days. The additive of 0,05% *Vemozyme® Plus* to the same diet (4-th group), improves significantly (P< 0,05) the live weight of the chickens, aged 28 (1423 g) and 42 days (2629 g) respectively with 8,0 and 5,7% (compared to 3-rd group), and the differences on this parameter between the 4-th and control group are statistically not significant.

The examined enzyme complex doesn't influenced practically the utilization of feed by the chickens, obtaining 100% balanced diets (2-nd experimental group). Broilers from 3-rd group, (negative control, fed 5 % reduced ME and DEAA diets, without addition of 0,05% *Vemozyme® Plus*) make worse remarkably – with 6,8-14,4% (P<0,05) the feed conversion, respectively through starter and grower periods, as result the chickens from 3-rd group, for total fatting period, have toward the control 5,7% a poorer feed conversion, but the difference among the groups is statistically not significant. The positive effect of the addition of 0,05% *Vemozyme® Plus* to the same ration (4-th grope), on this index is in unison with the results about their weight development, who have 11,0 (P<0,05) and 5,3% (P>0,05) better utilization of feed, respectively through the grower and total fatting period, compared to 3-rd group (without *Vemozyme® Plus*), and they practically equalized with the control-1732 and 1720 g, respectively. Valchev et al.(2000) find also significant positive results on the body weight and feed efficiency of growing pigs, by placement of 0,1% complex enzyme premix *Vemozyme® Plus* to the compound feeds with participation of 15% sunflower expeller.

**Table 2.** Live weight of the chickens*

| Indices | Groups | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | I-control 100% ME, 100% DEAA | | II – experimental 100% ME, 100% DEAA + 0,05% Vemozyme® Plus | | III – experimental 95% ME, 95% DEAA | | IV- experimental 95% ME, 95% DEAA + 0,05% Vemozyme® Plus | |
| | $\bar{x} \pm S\bar{x}$ | | $\bar{x} \pm S\bar{x}$ | | $\bar{x} \pm S\bar{x}$ | | $\bar{x} \pm S\bar{x}$ | |
| | g | % | g | % | g | % | g | % |
| Live weight on 1st day | 38 | | 38 | | 38,1 | | 38,3 | |
| Live weight on 10 days | $309^{a} \pm 7.44$ | 100 | $292^{ac} \pm 7.40$ | 94.5 | $284^{bc} \pm 5.34$ | 91.9<br>100 | $292^{ac} \pm 5.43$ | 94.5<br>102.8 |
| Live weight on 28 days | $1469^{a} \pm 38.29$ | 100 | $1462^{a} \pm 38.30$ | 99.5 | $1318^{bc} \pm 28.95$ | 89.7<br>100 | $1423^{a} \pm 28.44$ | 96.9<br>108.0 |
| Live weight on 42 days | $2693^{ac} \pm 66.50$ | 100 | $2714^{a} \pm 66.51$ | 100.8 | $2487^{bc} \pm 50.00$ | 92.4<br>100 | $2629^{a} \pm 50.00$ | 97.6<br>105.7 |

*The differences between the groups in horizontal level are significant in different letters.

On Table 4, the data, from slaughter and chemical analysis of white meat samples are presented. From all of groups, with the lowest grill weight (P<0,05) are the chickens from 3-rd group – 1699 g. The addition of *Vemozyme® Plus* (4-th group), in conformity with the results about the live weight, influences positively the grill weight – 1810 g, which is 6,5% higher (P<0,05), than 3-rd experimental group, and practically doesn't differ (P>0,05 ) from the grill weight of the control. The grill`s value, expressed as percent from the live weight, is equal practically about all of groups. The changes in weight of the breast and legs, as result of applied feed, follow these ones in the grill, but the differences between the groups aren't significant.

There is a positive tendency by added *Vemozyme® Plus* in the

**Table 3.** Feed efficiency, kg/kg live weight *

| Periods | Groups | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | I-control 100%ME, 100% DEAA | | II – experimental 100% ME, 100% DEAA + 0,05% Vemozyme® Plus | | III – experimental 95% ME, 95% DEAA | | IV- experimental 95% ME, 95% DEAA + 0,05% Vemozyme® Plus | |
| | $\bar{x} \pm S\bar{x}$ | | $\bar{x} \pm S\bar{x}$ | | $\bar{x} \pm S\bar{x}$ | | $\bar{x} \pm S\bar{x}$ | |
| | g | % | g | % | g | % | g | % |
| 1-10 day | 1.190[a] ± 0.020 | 100 | 1.188[a] ± 0.020 | 99.83 | 1.271[b] ± 0.021 | 106.8<br>100 | 1.275[b] ± 0.020 | 107.1<br>100.3 |
| 11-28 day | 1.469[a] ± 0.060 | 100 | 1.408[a] ± 0.060 | 95.8 | 1.680[b] ± 0.060 | 114.4<br>100 | 1.495[a] ± 0.060 | 101.8<br>89.0 |
| 29-42 day | 2.160[a] ± 0.106 | 100 | 2.167[a] ± 0.106 | 100.3 | 2.099[a] ± 0.106 | 97.2<br>100 | 2.098[a] ± 0.106 | 97.1<br>99.95 |
| 1-42 day | 1.720[a] ± 0.051 | 100 | 1.703[a] ± 0.051 | 99.0 | 1.818[a] ± 0.051 | 105.7<br>100 | 1.732[a] ± 0.051 | 100.7<br>95.3 |

*The differences between the groups in horizontal level are significant in different letters.

**Table 4**. Slaughter indices and meat composition*

| Indices | Groups | | | |
|---|---|---|---|---|
| | I | II | III | IV |
| | Control 100% ME 100% DEAA | Experimental 100% ME 100% DEAA + 0,05% Vemozyme® Plus | Experimental 95% ME 95% DEAA | Experimental 95% ME 95% DEAA + 0,05% Vemozyme® Plus |
| Number of chickens | 4 | 4 | 4 | 4 |
| Grill, g (%)<br>%, from the live weight | 1818[a] (100)<br>71.0 | 1835[a] (100.9)<br>71.0 | 1699[b] (93.4) /100/<br>71.0 | 1810[a] (99.6) /106.5/<br>71.9 |
| Breast, g (%)<br>%, from the grill | 675[a] (100)<br>37.1 | 700[a] (103.7)<br>38.1 | 619[a] (91.7) /100/<br>36.4 | 666[a] (98.7) /107.6/<br>36.8 |
| Legs, g (%)<br>% from the grill | 608[a] (100)<br>33.4 | 620[a] (102.0)<br>33.8 | 567[a] (93.3) /100/<br>33.4 | 614[a] (100.9) /108.3/<br>33.9 |
| Composition of the white meat (without skin), in natural moisture | | | | |
| Water, % | 73.41[a] | 73.99[b] | 75.15[ac] | 73.89[bc] |
| Protein, % | 22.71[a] | 23.08[a] | 22.43[a] | 22.97[a] |
| Fats, % | 2.42[a] | 2.42[a] | 1.90[b] | 2.79[a] |
| Ash, % | 0.98 | 1.04 | 0.96 | 1.17 |

*The differences between the groups in horizontal level are significant in different letters.

both types of diets (100% ME, 100% DEAA – 2$^{-nd}$ and 95% ME, 95% DEAA + 0,05% *Vemozyme® Plus* - 4$^{-th}$ group) on the contents of protein in the breast meat, but the differences between the groups aren't statistically significant. Least fats in the white meat from all of groups are collected by the chickens from 3$^{-rd}$ experimental group - 1,9%, (P<0,05), which can be explained with lower content of energy in the diets. The added enzyme preparation increased statistically significantly the fat content of white meat chicken in the 4$^{-th}$ group (2,79%), which could be connected with additionally liberated nutritive substances, by the action of multienzyme preparation.

## Conclusions

The additive of 0,05% *Vemozyme® Plus* to the balanced wheat-corn-soybean meal based diets for chickens broilers (Ross 308), didn't influence statistically the live weight and feed conversion through the 42 days fattening period. The feeding with compound feeds with 5% decreased level of ME and DEAA made worse the live weight of the chicks at age 10, 28 and 42 days with 8,1 % (P<0,05), 10,3 % (P<0,05) and 7,6%, respectively (P>0,05 ), and there is a tendency for decreasing with 5,7 % the feed efficiency for whole fattening period, toward the control.

The addition of 0,05% *Vemozyme® Plus* to the same compound feeds for chickens broilers, (with 5 % decreased level of energy and essential digestible amino acids) improves significantly with 8,0 % (at 28 days) and 5,7 % (at 42 days) the chickens` body weight, compare to the group without *Vemozyme® Plus*, and equalizes them practically by this index with the control with 100% energy and amino acids according to the standard.

The chickens, obtaining the diet with 5 % decreased level of ME and DEAA + additive of 0,05% *Vemozyme® Plus*, have practically the same feed conversion ratio with these ones from the control, being receiving balanced compound feeds (respectively 1,732 and 1,720 кg/kg), and with 5,3% better utilization of the feed (P>0,05) toward these ones obtaining the same compound feeds (3$^{-rd}$ group) without additive of 0,05% *Vemozyme® Plus.* The chickens, receiving the compound feeds with 5 % decreased level of energy and amino acids + additive of 0,05% *Vemozyme® Plus,* have the same grill weight, compared to the control (correspondently 1810 and 1818 g, P>0,05) and with 6,5 % (P<0,05) higher grill weight, toward these ones, obtaining the same compound feeds without additive of 0,05% *Vemozyme® Plus.* There aren't significant differences in protein and fat content in the white meat of chickens from the control group and those, receiving enriched with 0.05% *Vemozyme® Plus* balanced or 5% reduced ME and DEAA diets.

## References


**Annison G,** 1991. Relationship between the levels of soluble nonstarch polysaccharides and the apparent metabolizable energy of wheats assayed in broiler chickens. Journal of Agricultural and Food Chemistry, 39, 1252–1256.

**Annison G,** 1992. Commercial supplementation of wheat-based diets raises ileal glycanase activities and improves apparent metabolisable energy, starch and pentosan digestibilities in broiler chickens. Animal Feed Science and Technology, 38, (3), 105–121.

**AOAC,** 1990. Official Methods of Analisis. Association of Official Analytical Chemists, 15 th Ed., Washington, DC, USA.

**Bedford MR, Classen HL and Campbell GL,** 1991. The effect of pelleting, salt and pentosanase on the viscosity of intestinal contents and the performance of broilers fed rye. Poultry Science, 70, 1571–1577.

**Bedford MR and Classen HL,** 1992. Reduction of intestinal viscosity through manipulation of dietary rye and pentosanase concentration is effected through changes in the carbohydrate composition of the intestinal aqueous phase and results in improved growth rate and food conversion efficiency of broiler chicks. Journal of Nutrition, 122, 560–569.

**Bi Yu and Chung TK,** 2004. Effects of Multiple-Enzyme Mixtures on Growth Performance of Broilers Fed Corn-Soybean Meal Diets. Poultry Science Association, Inc., Jap:Research Report, 178-182.

**Choct M, Hughes RJ, Trimble RP, Angkanaporn K and Annison G**, 2009. Journal of Nutrition, 8, 485-492.

**Choct M and Annison G,** 1992a. The inhibition of nutrient digestion by wheat pentosans. British Journal of Nutrition, 67, 123–132.

**Choct M and Annison G,** 1992b. Anti-nutritive activity of wheat arabinoxylans: role of viscosity and gut microflora. British Poultry Science, 33, 821–834.

**Georgieva V, Marinov B and Pavlov D,** 1997. Effect by the additive of enzyme preparation Roxazyme G to the compound feeds for chickens broilers with different grain wheat component. I. Compound feeds withwheat,Stock-breeding sciences, (application), 92-95.

**Mathlouthi N, Mallet S, Saulnier L, Quemener B and Larbier M,** 2002. Effects of xilanase and β-glucanase addition on performance, nutrient digestibility, and physico-chemical conditions in the small intestine contents and caecal microflora of broiler chickens fed a wheat and barley-based diet. Animal Research, 51, 395-406.

**McNab JM,** 1996. Factors affecting the energy value of wheat for poultry. World`s Poultry Science Journal, 52, 69-73.

**Valchev G, Surdjiska S and Vasilev M**, 2000. www.vemo-vsv.com

**Ward NE,** 1995. With dietary modifications, wheat can be used for poultry. Feedstuffs, 7, 14–16.

***Instruction for authors***

**Preparation of papers**

Papers shall be submitted at the editorial office typed on standard typing pages (A4, 30 lines per page, 62 characters per line). The editors recommend up to 15 pages for full research paper ( including abstract references, tables, figures and other appendices)

**The manuscrip**t should be structured as follows: Title, Names of authors and affiliation address, Abstract, List of keywords, Introduction, Material and methods, Results, Discussion, Conclusion, Acknowledgements (if any), References, Tables, Figures.

**The title** needs to be as concise and informative about the nature of research. It should be written with small letter /bold, 14/ without any abbreviations.

**Names and affiliation of authors**

The names of the authors should be presented from the initials of first names followed by the family names. The complete address and name of the institution should be stated next. The affiliation of authors are designated by different signs. For the author who is going to be corresponding by the editorial board and readers, an E-mail address and telephone number should be presented as footnote on the first page. Corresponding author is indicated with *.

**Abstract** should be not more than 350 words. It should be clearly stated what new findings have been made in the course of research. Abbreviations and references to authors are inadmissible in the summary. It should be understandable without having read the paper and should be in one paragraph.

**Keywords:** Up to maximum of 5 keywords should be selected not repeating the title but giving the essence of study.

**The introduction** must answer the following questions: What is known and what is new on the studied issue? What necessitated the research problem, described in the paper? What is your hypothesis and goal ?

**Material and methods:** The objects of research, organization of experiments, chemical analyses, statistical and other methods and conditions applied for the experiments should be described in detail. A criterion of sufficient information is to be possible for others to repeat the experiment in order to verify results.

**Results** are presented in understandable tables and figures, accompanied by the statistical parameters needed for the evaluation. Data from tables and figures should not be repeated in the text. **Tables** should be as simple and as few as possible. Each table should have its own explanatory title and to be typed on a separate page. They should be outside the main body of the text and an indication should be given where it should be inserted.

**Figures** should be sharp with good contrast and rendition. Graphic materials should be preferred. Photographs to be appropriate for printing. Illustrations are supplied in colour as an exception after special agreement with the editorial board and possible payment of extra costs. The figures are to be each in a single file and their location should be given within the text.

**Discussion:** The objective of this section is to indicate the scientific significance of the study. By comparing the results and conclusions of other scientists the contribution of the study for expanding or modifying existing knowledge is pointed out clearly and convincingly to the reader.

**Conclusion:** The most important consequences for the science and practice resulting from the conducted research should be summarized in a few sentences. The conclusions shouldn't be numbered and no new paragraphs be used. Contributions are the core of conclusions.

**References:**

In the text, references should be cited as follows: single author: Sandberg (2002); two authors: Andersson and Georges (2004); more than two authors: Andersson et al.(2003). When several references are cited simultaneously, they should be ranked by chronological order e.g.: (Sandberg, 2002; Andersson et al., 2003; Andersson and Georges, 2004). References are arranged alphabetically by the name of the first author. If an author is cited more than once, first his individual publications are given ranked by year, then come publications with one co-author, two co-authors, etc. The names of authors, article and journal titles in the Cyrillic or alphabet different from Latin, should be transliterated into Latin and article titles should be translated into English. The original language of articles and books translated into English is indicated in parenthesis after the bibliographic reference (Bulgarian = Bg, Russian = Ru, Serbian = Sr, if in the Cyrillic, Mongolian = Mo, Greek = Gr, Georgian = Geor., Japanese = Ja, Chinese = Ch, Arabic = Ar, etc.)

The following order in the reference list is recommended:

**Journal articles:** Author(s) surname and initials, year. Title. Full title of the journal, volume, pages. Example:

**Simm G, Lewis RM, Grundy B and Dingwall WS**, 2002. Responses to selection for lean growth in sheep. Animal Science, 74, 39-50

**Books:** Author(s) surname and initials, year. Title. Edition, name of publisher, place of publication. Example:

**Oldenbroek JK**, 1999. Genebanks and the conservation of farm animal genetic resources, Second edition. DLO Institute for Animal Science and Health, Netherlands.

**Book chapter or conference proceedings:** Author(s) surname and initials, year. Title. In: Title of the book or of the proceedings followed by the editor(s), volume, pages. Name of publisher, place of publication. Example:

**Mauff G, Pulverer G, Operkuch W, Hummel K and Hidden C**, 1995. C3-variants and diverse phenotypes of unconverted and converted C3. In: Provides of the Biological Fluids (ed. H. Peters), vol. 22, 143-165, Pergamon Press. Oxford, UK.

**Todorov N and Mitev J**, 1995. Effect of level of feeding during dry period, and body condition score on reproductive performance in dairy cows, IX th International Conference on Production Diseases in Farm Animals, Sept.11 – 14, Berlin, Germany, p. 302 (Abstr.).

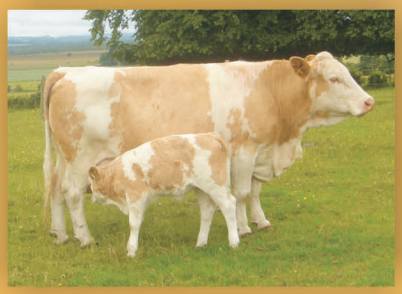
**Thesis:**

**Penkov D**, 2008. Estimation of metabolic energy and true digestibility of amino acids of some feeds in experiments with muscus duck (Carina moshata, L). Thesis for DSc. Agrarian University, Plovdiv, 314 pp.

The Editorial Board of the Journal is not responsible for incorrect quotes of reference sources and the relevant violations of copyrights.

# AGRICULTURAL SCIENCE AND TECHNOLOGY

Volume 2, Number 4
December 2010

CONTENTS




Journal web site:
**www.uni-sz.bg/ascitech/index.html**

Publisher:
www.alfamarket.biz