



Online Version ISSN: 1314-412X  
Volume 3, Number 4  
December 2011

# *AGRICULTURAL SCIENCE AND TECHNOLOGY*

2011

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

### **Editor-in-Chief**

*Tsanko Yablanski*  
Faculty of Agriculture  
Trakia University, Stara Zagora  
Bulgaria

### **Co-Editor-in-Chief**

*Radoslav Slavov*  
Faculty of Agriculture  
Trakia University, Stara Zagora  
Bulgaria

### **Editors and Sections**

#### **Genetics and Breeding**

*Atanas Atanassov (Bulgaria)*  
*Ihsan Soysal (Turkey)*  
*Max Rothschild (USA)*  
*Stoitcho Metodiev (Bulgaria)*

#### **Nutrition and Physiology**

*Nikolai Todorov (Bulgaria)*  
*Peter Surai (UK)*  
*Zervas Georgios (Greece)*

#### **Production Systems**

*Dimitar Pavlov (Bulgaria)*  
*Dimitar Panaiotov (Bulgaria)*  
*Jordan Staikov (Bulgaria)*  
*Georgi Zhelyazkov (Bulgaria)*

#### **Agriculture and Environment**

*Georgi Petkov (Bulgaria)*  
*Ramesh Kanwar (USA)*

#### **Product Quality and Safety**

*Marin Kabakchiev (Bulgaria)*  
*Stefan Denev (Bulgaria)*

#### **English Editor**

*Yanka Ivanova (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](mailto: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 an 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 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](http://www.uni-sz.bg).

### **Copyright**

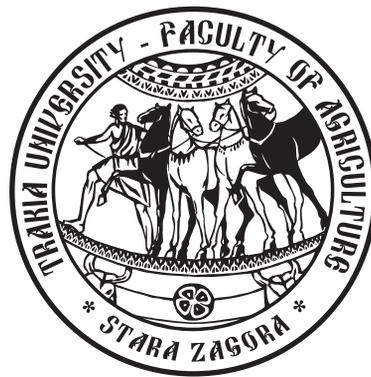
All rights reserved. No part of this publications may be translated into other languages, reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying or any information storage and retrieval system without permission in writing from the publisher.

### **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](mailto:ascitech@uni-sz.bg)



*AGRICULTURAL  
SCIENCE AND TECHNOLOGY*

2011

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



## Agriculture and Environment

# Influence of the farming, soil cultivation and Fertilization on the yield of wheat

M. Nankov, L. Glogova\*

Maize Research Institute, 5835 Kneja, Bulgaria

**Abstract.** Experience was taken for 50 years of typical chernozem soil type in the experimental Field of the Maize Research Institute – Kneja. The study take in period 2000-2010 year. The cultivation of wheat in the unit with maize has positive effect on performance mass 1000 grains, hectoliter weight and grain yield. Compared to monoculture wheat grain yield increased with 16, 69%. Deepening of plowing in monoculture wheat has no effect on quantity of grain yield to plowing to 10-12cm (A<sub>2</sub>). The differences between the test variants are minimal and do not prove mathematically. Fertilization has positive effect on performance mass 1000 grains and grain yield. Compared variants without fertilization, grain yield increases with 1228 kg/ha for A<sub>1</sub>, 880kg/ha for A<sub>2</sub>, 953 kg/ha for A<sub>3</sub>, 804 kg/ha for A<sub>4</sub> and 908 kg/ha for A<sub>5</sub> and is proved in the mathematical LSD- 0,1%.

**Keywords:** wheat, monoculture, tillage, fertilization

## Introduction

Wheat is a major grain bread culture of our country. Area that has grown around 12 million decare. It requires the part of wheat be sown behind (short monoculture) which has a negative impact on its productive possibility. Number of studies at home and abroad has found that the formation of maximum productivity of wheat as driven by weather – rainfall average temperature in fall and winter months and IV, V and VI and method of cultivation (Drumalieva, 1974; Zarkov, 2000; Nankov et al., 2006; Nankov, 2007).

Conditions of Northwestern Bulgaria carbonate chernozem soil type cultivation of wheat as a monoculture (4 years) reduces the yield of 60 kg/da compared with grain yield formed after maize and beans (Penchev et al., 2000; Christoph and Petrov, 2009; Christoph and Angelova, 2008).

The aim of the study was to examine the impact of the forming method the depth of plowing and mineral fertilization on the productive possibilities of wheat.

## Material and methods

Experience was taken for 50 years of typical chernozem soil type in the experimental field of the Maize Research Institute – Kneja. The study take in period 2000-2010 years. Wheat is grown in the unit with maize and monoculture. Experience was taken in the block method with a size vintage parcel 25 m<sup>2</sup> the following factors were studied:

Factor A – tillage;

Unit wheat – maize – A<sub>1</sub> – tillage with plow for 10-12 cm;

Wheat monoculture – A<sub>2</sub> – with plow tillage to 10-12 cm, A<sub>3</sub> – tillage with plow 18-20 cm, A<sub>4</sub> – tillage with plow 23-25 cm and A<sub>5</sub> – plow tillage with a 30-35 cm. Pre-sowing cultivation was double-cultivation with harrow tillage.

Factor B – fertilization – N<sub>100</sub>P<sub>100</sub> kg/ha active substance.

Test is a control variant without fertilization. Anti-weed vegetation were used following herbicide – Maton 1200 ml/ha tillering phase and Puma Super 7,5 EV – 1000 ml/ha phase 3-5 leaf weeds including wild oats. Timely crop was treated with fungicides and insecticides in an attack by diseases and pests than the established the threshold of harmfulness. The results of the resulting yield are made using the variance analysis.

## Results and discussion

Rainfall during vegetation period are critical for growth, development and formation of maximum productivity of wheat years of rainfalls is less, but over 5 years in more than an average of 50 years. At Table 1 was indicates the number of stems of wheat – ear of m<sup>2</sup>. Average for the period of study under conditions without fertilization (B<sub>0</sub>) they are in the range of 317 to 330 n/m<sup>2</sup>. With the inclusion of intensive fertilization factor the number increased in all tested variants, the greatest increase was found in unit A<sub>1</sub> – 33,54%. Average fertilization and control variant (B<sub>0</sub>), rotation of wheat with maize increased the number of stems of wheat – ear compared with monoculture 7,32%. Sinking of plowing 18-20 cm (A<sub>3</sub>), 23-25 cm (A<sub>4</sub>) and 30-35 (A<sub>5</sub>) in monoculture does not affect the values of this index. compared with A<sub>2</sub> (plowing of 10-12 cm).

The mass of 1000 grains (Table 2) is determined in most weather conditions during the pouring grain crop density and number of grains in 1 wheat-ear. Average for the period of study in control variants sowing grain formed weighing 47,53 to 48,79 grams. Fertilization with N<sub>100</sub>P<sub>100</sub> increases weight of grain from 1,87 to 2,80%. Growing wheat after maize increases the mass of grains with 2,01 to wheat monoculture. Sinking of plowing 18-20 cm (A<sub>3</sub>), 23-25 cm (A<sub>4</sub>) and 30-35 cm (A<sub>5</sub>) in wheat monoculture does not affect the values of this index.

The hectolitre weight of seed in Table 3 in control variant in the range of 67,93 to 70,16 kg. Not increased under the influence of

\* e-mail: lubaglogova@abv.bg

**Table 1.** Number of wheat –ears /m<sup>2</sup>

Variants	N <sub>0</sub> P <sub>0</sub>	N <sub>100</sub> P <sub>100</sub>	Average, n/dka	% to A <sub>1</sub>	% to A <sub>2</sub>
A <sub>1</sub> - plowing 10-12 cm	322	430	376	100.00	-
A <sub>2</sub> - plowing 10-12 cm	323	374	348.5	92.68	100.00
A <sub>3</sub> . plowing 18-20 cm	322	369	345.5	91.88	99.13
A <sub>4</sub> - plowing 23-25 cm	317	377	347	92.28	99.56
A <sub>5</sub> –plowing 30-35 cm	330	383	356.5	94.81	102.29

**Table 2.** Mass of 1000 grains, g

Variants	N <sub>0</sub> P <sub>0</sub>	N <sub>100</sub> P <sub>100</sub>	Average, n/dka	% to A <sub>1</sub>	% to A <sub>2</sub>
A <sub>1</sub> - plowing 10-12 cm	48.79	50.16	49.47	100.00	-
A <sub>2</sub> - plowing 10-12 cm	48.24	49.32	48.78	98.60	100.00
A <sub>3</sub> . plowing 18-20 cm	47.53	49.81	48.42	97.87	99.26
A <sub>4</sub> - plowing 23-25 cm	47.85	48.80	48.32	97.67	99.05
A <sub>5</sub> –plowing 30-35 cm	48.48	49.39	48.93	98.90	100.30

**Table 3.** Hectolitrelly weight / kg

Variants	N <sub>0</sub> P <sub>0</sub>	N <sub>100</sub> P <sub>100</sub>	Average, kg/ha	% to A <sub>1</sub>	% to A <sub>2</sub>
A <sub>1</sub> - plowing 10-12 cm	70.16	70.55	70.35	100.00	-
A <sub>2</sub> - plowing 10-12 cm	69.39	69.15	69.27	98.46	100.00
A <sub>3</sub> . plowing 18-20 cm	68.99	67.93	68.46	97.31	98.83
A <sub>4</sub> - plowing 23-25 cm	68.08	69.37	68.72	97.68	99.20
A <sub>5</sub> –plowing 30-35 cm	67.93	68.59	68.26	97.02	98.54

mineral fertilization. Higher values are received in unit A<sub>1</sub> – wheat-maize. There is a trend of decreasing values of hectolitre weight in the variants of deepening of plowing in monoculture of 18-20 cm, 23-25 and 30-35 cm.

The resulting grain yield (Table 4) in the natural reserves of soil nutrients in the range of 1554 to 1813 kg/ha. The highest grain yield was received in unit wheat-maize (A<sub>1</sub>). Deepening of plowing under monoculture of 23-25 cm (A<sub>4</sub>) and 30-35 cm (A<sub>5</sub>) increases yield compared A<sub>2</sub> (plowing of 10-12 cm) with 3,91% and 8,40%.

Fertilization with N<sub>100</sub>P<sub>100</sub> increased grain yield in all tested variants by 1228 kg/ha for A<sub>1</sub>, 880 kg/ha A<sub>2</sub>, 953 kg/ha for A<sub>3</sub>, 804 kg/ha for A<sub>4</sub> and 908 kg/ha for A<sub>5</sub> and demonstrated in the mathematical LSD-0,1%. Average fertilization and without fertilization variants highest grain yield 2427 kg/ha was received from the unit A<sub>1</sub> – wheat-

maize. Outweigh in comparison with monoculture wheat is 405 kg/ha and is demonstrated in LSD-0,1%. Deepening of plowing on 18-20 cm (A<sub>3</sub>) 22-25 cm (A<sub>4</sub>) and 30-35 cm (A<sub>5</sub>) does not affect on values of grain yield.

## Conclusion

The cultivation of wheat in the unit with maize has positive effect on performance mass 1000 grains, hectolitre weight and grain yield. Compared to monoculture wheat grain yield increased with 16,69%. Deepening of plowing in monoculture wheat has no effect on quantity of grain yield to plowing to 10-12 cm (A<sub>2</sub>). The differences between the test variants are minimal and do not prove

**Table 4.** Grain yield kg/ha

Variants	N <sub>0</sub> P <sub>0</sub>	N <sub>100</sub> P <sub>100</sub>	Average, kg/ha	% to A <sub>1</sub>	% to A <sub>2</sub>
A <sub>1</sub> - plowing 10-12 cm	1813	3041	2427	100,00	-
A <sub>2</sub> - plowing 10-12 cm	1582	2462	2022	83.31	100.00
A <sub>3</sub> - plowing 18-20 cm	1554	2507	2030	83.66	100.39
A <sub>4</sub> - plowing 23-25 cm	1645	2449	2047	84.34	101.23
A <sub>5</sub> - plowing 30-35 cm	1715	2623	2169	89.36	107.27
LSD – cultivation	LSD – fertilization				
5% - 13.65	5% - 29.23				
1% - 18.10	1% - 38.76				
0,1% - 23.43	0,1% - 50.18				

mathematically.

Fertilization has positive effect on performance mass 1000 grains and grain yield. Compared variants without fertilization grain yield increases with 1228 kg/ha for A<sub>1</sub>, 808 kg/ha for A<sub>2</sub>, 953 kg/ha for A<sub>3</sub>, 804 kg/ha for A<sub>4</sub> and 908 kg/ha for A<sub>5</sub> and is proved in the mathematical LSD-0,1%.

## References

- Christoph I and Pertov N**, 2009. Effect of soil cultivation and fertilization in predecessor on the yield of wheat in terms of carbonate chernozem. *Agricultural Science*, 4, 33-38.
- Christoph I and Angelova V**, 2008. Productivity of rotation in different degrees of saturation with wheat. International conference Bulgarian science and ERA, 5 to 6 June, Stara Zagora, CD.
- Drumalieva, D**, 1974. Maintaining and improving soil fertility.
- Nankov M**, 2007. Productivity and quality of wheat after different predecessors. Eight scientific practical conference with international participation, Agroeko, Plovdiv, LII, 107-110.
- Nankov M, Glogova L and Tsankova G**, 2006. Study on the yield of dray matter and crude protein from wheat grown behaving. International science conference Stara Zagora, June 1-2, 1, plant studies 284-289.
- Penchev M and B. Gramatikov**, 2000. Influence of some factors on the agricultural productivity of wheat variety Mariana. *Plant science*, 10, 899-901 (Bg).
- Zarkov B**, 2000. Varietal reaction of winter barley grown as short-term monoculture. *Plant science*, 10, 875-879 (Bg).

**CONTENTS**

1 / 2

**Reviews**

---

- 1. Lameness scoring systems for cattle in dairy farms** 291  
T. Penev

**Genetics and Breeding**

---

- 2. Body and carcass parameters of sea bream (*Sparus aurata* L.) and sea bass (*Dicentrarchus labrax* L.)** 299  
M. Marinova, I. Sirakov, Y. Staykov, E. Ivancheva
- 3. Effect of breed upon blood lysozyme and complement activity in different sheep breeds** 302  
L. Sotirov, Ts. Koynarski, V. Semerdjiev, D. Dimov, S. Laleva, P. Slavova, M. Iliev, D. Yarkov
- 4. Winter wheat productivity under favorable and drought environments III. Effect of fertilization** 306  
A. Ivanova, N. Tsenov
- 5. Evaluation of perspective sorghum breeding forms in their reaction to some diseases in field conditions** 310  
M. Georgieva – Andreeva, K. Tanova, S. Raykov

**Nutrition and Physiology**

---

- Effect of dietary coconut oil supplementation on some blood biochemical indices in yearling rams** 313  
T. Slavov, V. Radev, K. Sivkova, I. Varlyakov
- Pharmacokinetics of tilmicosin after oral application of Pulmotil G 200 – premix in pigs** 318  
D. Dimitrova, V. Katsarov, D. Dimitrov, D. Tsoneva
- Epidermal growth factor content in rabbit doe milk during the different lactation stages** 323  
E. Vachkova, B. Bivolarski
- Intraorbital glands in turkey broilers. III. Lacrimal gland histometry** 327  
D. Dimitrov
- Effect of body condition score at calving on body condition during lactation in Holstein and Brown Swiss cows** 330  
Zh. Gergovska, T. Angelova, D. Yordanova, Zh. Krastanov, Ch. Miteva
- Use of brewer's grains for feeding of lambs** 336  
A. Kirilov, K. Ivanov

**Production Systems**

---

- The effect of the milking liner design on the parameters of the milking machine pulsation system** 339  
V. Vlashev, B. Banev, K. Peichev, G. Dineva
- Accumulation dynamic of *Ruta graveolens* L. essential oil** 343  
A. Dzhurmanski, G. Zhekova, D. Angelova
- Research on the water regimen of soil upon the production of vine planting material** 346  
N. Kovachev, N. Taneva, V. Kovachev, L. Halil

**Agriculture and Environment**

---

- Influence of the farming, soil cultivation and Fertilization on the yield of wheat** 351  
M. Nankov, L. Glogova
- Study on the applicability of a natural geomaterial for mononitrophenol removal from simulated agricultural run-off water** 354  
Z. Yaneva, B. Koumanova, N. Georgieva

**CONTENTS**

2 / 2

---

<b>Comparative technical and economic analysis of variants for cleaning and storage of manure on a farm for 108 – 120 dairy cows</b>	<b>359</b>
V. Dimova, D. Dinev, Y. Popova, Y. Mitev	
<b>Distribution of the black mussel <i>Mytilus galloprovincialis</i> (L.) along the Bulgarian Black Sea coast</b>	<b>368</b>
E. Petrova, St. Stoykov	
<b>Toxicity of plant protection products towards the imago of <i>Encarsia Formosa</i> Gah.</b>	<b>374</b>
V. Yankova, S. Masheva, B. Boev, K. Toskov	
<b>Effect of the rhizobacterium <i>Bacillus subtilis</i> on the development of the root-knot nematode <i>Meloidogyne arenaria</i> at different temperatures</b>	<b>378</b>
M. Mohamedova, H. Samaliev	
<b>Product Quality and Safety</b>	
<hr/>	
<b>Fatty acid composition of yogurt supplemented with walnut extract</b>	<b>384</b>
S. Boycheva, N. Naydenova, G. Mihaylova, T. Dimitrov, D. Pavlov	
<b>Near Infrared Spectroscopy for monitoring changes during yellow cheese ripening</b>	<b>390</b>
S. Atanassova, N. Naydenova, T. Kolev, T. Iliev, G. Mihaylova	
<b>Short communications</b>	
<hr/>	
<b>Mechanical correction the traction weight of a farm wheeled tractor</b>	<b>395</b>
D. Irinchev	
<b>Possibilities for increasing the yield and quality of asters (<i>Callistephus chinensis</i> L.) cut flower</b>	<b>397</b>
N. Miteva, O. Tafradziiski	

## **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 manuscript** 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<sup>th</sup> 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 muscovy duck (*Carina moschata*, 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 3, Number 4  
December 2011



Journal web site:  
[www.uni-sz.bg/ascitech/index.html](http://www.uni-sz.bg/ascitech/index.html)

  
Publisher:  
[www.alfamarket.biz](http://www.alfamarket.biz)