



ISSN 1313 - 8820
Volume 2, Number 3
September 2010

AGRICULTURAL SCIENCE AND TECHNOLOGY

2010

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 Atanasov (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)
Yuliana Yarkova (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. 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.

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

ISSN 1313 - 8820

Volume 2, Number 3
September 2010



AGRICULTURAL SCIENCE AND TECHNOLOGY

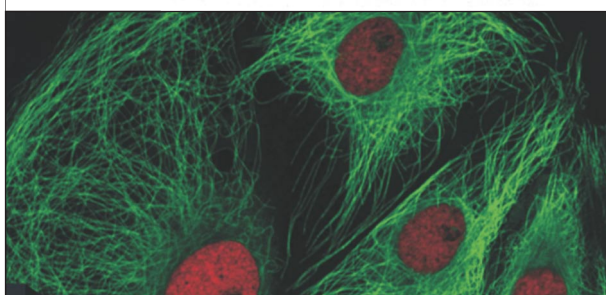
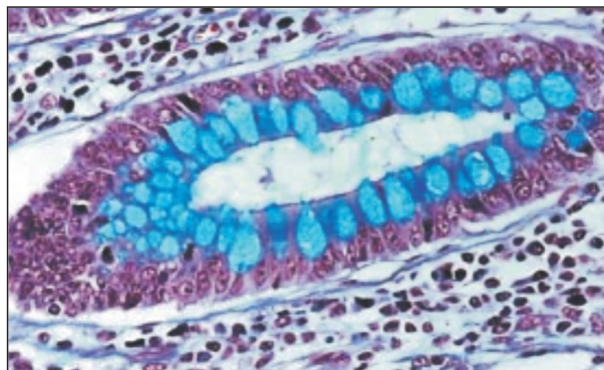
2010

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

OLYMPUS

Your Vision, Our Future

Като лидер на пазара за оптично-цифрови технологии и доставчик на една от най-широките гами микроскопи, Olympus приема предизвикателството и ускорява разработването на интелигентни и рентабилни системни решения. Olympus предлага цялостна гама продукти, покриваща всички възможни приложения: от учебни и рутинни микроскопи до най-висококачествени образни системи, приложими както в биологичните науки, така и в индустрията.



Olympus, as a market leader in optical digital technologies and supplier of one of the widest microscopy ranges, accepts the challenge and accelerates the development of intelligent and beneficial system solutions. Olympus offers a complete product range covering every possible application: from training and routine microscopes to image systems of highest quality applicable both in life science and in material science.

Изключителен дистрибутор на медицински
продукти на фирма Olympus в България
Инфомед ЕООД
Бизнес Център Сердика,
Сграда 1, ет. 3, Бул. Акад. Иван Гешов 2Е
Тел: 02 / 489 1700 , Факс: 02 / 491 8818
e-mail: office@infomed.bg
web: www.infomed.bg

Infomed
Medical Visual Systems

Distributor of Olympus Medical
Equipment in Bulgaria
Infomed Ltd.
Business Center Serdika, Building 1, Floor 3 ,
2E, Akad. Ivan Geshov Blvd.
Tel: + 359 2 489 1700 , Fax: + 359 2 491 8818
e-mail: office@infomed.bg
web: www.infomed.bg

Effect of fertilization and predecessor on chemical composition and energy value of wintering oats grain

M. Dimitrova – Doneva^{1*}, R. Petkova²

¹Experimental Station of Agriculture, 8300 Sredets, Bulgaria.

²Agricultural Institute, 6000 Stara Zagora, Bulgaria.

Abstract. A study has been conducted at the Experimental Station of Agriculture, Sredets to establish the effect of predecessor and mineral fertilization on chemical composition and energy value of wintering oats grain. The object of this study was wintering oat (*Avena sativa* L) variety Jubile cultivated after predecessors (A): stubble (A_1), sorghum (*Sorghum vulgare* Pers) (A_2) and rape (*Brassica napus* var. *oleifera* L) (A_3) and fertilization, kg/ha - (B): $N_{40}P_{100}K_{50}-B_1$; $N_{80}P_{100}K_{50}-B_2$; $N_{120}P_{100}K_{50}-B_3$ and B_0 , control $N_0P_{100}K_{50}$. The study covers chemical analysis of wintering oats grain made by Weende method. Calculations for the nutritive value of feed grain based on data obtained from chemical analysis were made (for ruminants) expressed in gross energy (GE) - MJ/kg dry substance, metabolizable energy (ME) - MJ/kg dry substance, feed units for milk (FUM, kg) and feed units for growth (FUG, kg) of dry substance – by using empirical equations. It was found that the predecessors stubble and rape increase the content of crude protein, crude fat and crude fibers in oats by 10.5 and 12.1%, 5.2 and 3.9%, 5.6 and 1.2%. The content of minerals and nitrogen-free extract (NFE) was the highest after predecessor sorghum. Increasing the doses of nitrogen fertilizer led to increasing the content of crude protein and fibers in grains on average by 14.4% and decreases the content of crude fats, ash and NFE by 7.0%, 3.2% and 3.4%, respectively. The differences in chemical composition of oat grains did not have a significant impact on its energy value expressed by GE, ME, (FUM) and (FUG).

Keywords: oat, fertilization, predecessor, chemical composition, energy value

Abbreviations: GE – gross energy, ME – metabolizable energy, NE – net energy, FUM – feed units for milk, FUG – feed units for growth, NFE – nitrogen-free extract

Introduction

The significance of oat, the grain of which is characterized by specific nutrients, determines it as an indispensable concentrated fodder especially for young and growing animals. The quality of winter oat grain is determined by various biochemical and physical parameters, depending on genotype, soil and climatic conditions of the area and farming technology. Several researchers establish the positive impact of the predecessor and mineral fertilization on productivity and quality of grain (Andrianov, 2000; Antonova and Dimov, 2002; Savova and Koteva, 1999; Savova, 2001; Todorov, 1995). As these crops are source of concentrated fodder in the rations of animals, the establishment of their energy nutritive value is essential for stock breeding science and practice. It is necessary for the functioning of many vital processes to feed livestock and to obtain the planned production from them (Iliev et al., 2004; Todorov et al., 2001; Shindarska and Ignatova, 2001).

This study aims to determine the impact of the predecessor and mineral fertilization on the chemical composition and energy value of wintering oats grain for the conditions of Strandzha.

Material and methods

The study was conducted during 2001-2004 in the experimental field of the experimental station in Sredets, Bulgaria. The soil in the tested area was leached maroon forest soil, low supplied with

available nitrogen, phosphorus and potassium in good stocks. The object of this study was wintering oat variety Jubilee 4, cultivated after predecessors (A): stubble (A_1), sorghum (*Sorghum vulgare* Pers) (A_2) and rape (*Brassica napus* var. *oleifera* L) (A_3), and fertilization with kg/ha (B) ($N_{40}P_{100}K_{50}-B_1$, $N_{80}P_{100}K_{50}-B_2$, $N_{120}P_{100}K_{50}-B_3$ and control $N_0P_{100}K_{50}-B_0$)

The study covers: chemical analysis of wintering oat grain made by Weende method. Calculations were made based on data obtained from chemical analysis for nutritive value of feed grain (for ruminants), expressed in gross energy (GE) - MJ/kg, metabolizable energy (ME) - MJ/kg of dry substance, feed units for milk (FUM, kg) and feed units for growth (FUG, kg) dry substance – by using empirical equations, described by Todorov et al. (2001).

Results and discussion

Data on the content of crude nutrients in grain of wintering oats, depending on the predecessor and mineral fertilization, on average for the period, are given in Table 1. Studied factors - predecessor sorghum has the smaller impact on the content of crude protein, crude fat and crude fiber and stronger impact on the levels of mineral substances and nitrogen-free extract (NFE) raising them by 6.5 and 2.8%, respectively. Higher influence on the content of crude protein, crude fat and crude fiber had the predecessors stubble and rape as they increased their values by 10.5 and 12.1%, 5.2 and 3.9%, 5.6 and 1.2%.

* e-mail: md_doneva@abv.bg

Table 1. Chemical composition of the fodder– g/kg dry substance, average for the period

Variants		Crude protein	Crude fat	Crude fiber	Ash	NFE
Predecessor (A)	Fertilization kg/ha (B)					
Stubble A ₁	B ₀ (N ₀ P ₁₀₀ K ₅₀)	120.3	65.6	86.6	41.4	686.1
	B ₁ (N ₄₀ P ₁₀₀ K ₅₀)	129.6	64.0	98.7	41.8	665.9
	B ₂ (N ₈₀ P ₁₀₀ K ₅₀)	135.4	64.0	97.5	40.3	662.8
	B ₃ (N ₁₂₀ P ₁₀₀ K ₅₀)	151.9	60.1	107.5	40.9	639.6
Average A ₁		134.3	63.43	97.58	41.1	663.6
Sorghum A ₂	B ₀ (N ₀ P ₁₀₀ K ₅₀)	105.0	63.8	85.7	44.7	700.8
	B ₁ (N ₄₀ P ₁₀₀ K ₅₀)	122.9	62.1	91.8	44.9	678.3
	B ₂ (N ₈₀ P ₁₀₀ K ₅₀)	127.3	58.0	95.6	43.7	675.4
	B ₃ (N ₁₂₀ P ₁₀₀ K ₅₀)	130.7	57.3	96.3	41.9	673.8
Average A ₂		121.48	60.3	92.35	43.8	682.08
Rape A ₃	B ₀ (N ₀ P ₁₀₀ K ₅₀)	129.3	67.4	83.4	44.0	675.9
	B ₁ (N ₄₀ P ₁₀₀ K ₅₀)	131.3	65.8	93.1	42.2	667.6
	B ₂ (N ₈₀ P ₁₀₀ K ₅₀)	139.6	60.9	93.9	39.8	665.8
	B ₃ (N ₁₂₀ P ₁₀₀ K ₅₀)	144.8	56.7	103.3	42.2	653.0
Average A ₃		136.25	62.7	93.43	42.05	665.58

Fertilization had more significant influence on the chemical composition, compared to predecessors. An increase of the amount of protein on average was found for the options by 8.7% as a result of fertilization with the lowest nitrogen rate N₄₀P₁₀₀K₅₀ during the study. Further increase of nitrogen rate of N₈₀ and N₁₂₀ kg/ha of active

substance increased the content of protein by 13.9 and 20.8% on average compared to the control N₀P₁₀₀K₅₀. This fertilization influenced on the content of crude fibers in an appropriate way by increasing them on average for the period by 10.8%, 12.2% and 20.1% compared to the control. The tested options with increasing

Table 2. Content of GE, ME and NE -MJ/kg dry substance, average for the period

Variants		GE MJ/kg			ME MJ/kg			NE MJ/kg		
Predecessor (A)	Fertilization kg/ha (B)	Average	B % to A ₁ B ₀	B % to B ₀	Average	B % to A ₁ B ₀	B % to B ₀	Average	B % to A ₁ B ₀	B % to B ₀
Stubble A ₁	B ₀ (N ₀ P ₁₀₀ K ₅₀)	18.79	100.00	100.00	12.55	100.00	100.00	7.60	100.00	100.00
	B ₁ (N ₄₀ P ₁₀₀ K ₅₀)	18.86	100.37	100.37	12.44	99.12	99.12	7.48	98.40	98.40
	B ₂ (N ₈₀ P ₁₀₀ K ₅₀)	18.94	100.79	100.79	12.40	98.80	98.80	7.49	98.52	98.52
	B ₃ (N ₁₂₀ P ₁₀₀ K ₅₀)	19.01	101.17	101.17	12.21	97.29	97.29	7.34	96.58	96.58
Average A ₁		18.90		100.00	12.40		100.00	7.48		100.00
Sorghum A ₂	B ₀ (N ₀ P ₁₀₀ K ₅₀)	18.58	98.88	100.00	12.51	99.68	100.00	7.59	99.87	100.00
	B ₁ (N ₄₀ P ₁₀₀ K ₅₀)	18.70	99.52	100.64	12.40	98.80	99.12	7.49	98.59	98.71
	B ₂ (N ₈₀ P ₁₀₀ K ₅₀)	18.68	99.41	100.53	12.30	98.00	98.32	7.42	97.66	97.79
	B ₃ (N ₁₂₀ P ₁₀₀ K ₅₀)	18.77	99.89	101.02	12.22	97.37	97.68	7.42	97.60	97.73
Average A ₂		18.68		100.53	12.35		99.59	7.48		98.55
Rape A ₃	B ₀ (N ₀ P ₁₀₀ K ₅₀)	18.82	100.15	100.00	12.58	100.23	100.00	7.60	100.04	100.00
	B ₁ (N ₄₀ P ₁₀₀ K ₅₀)	18.90	100.58	100.42	12.43	99.04	98.80	7.53	99.08	99.04
	B ₂ (N ₈₀ P ₁₀₀ K ₅₀)	18.91	100.63	100.47	12.34	98.32	98.09	7.47	98.33	98.29
	B ₃ (N ₁₂₀ P ₁₀₀ K ₅₀)	18.84	100.26	100.10	12.21	97.29	97.05	7.33	96.50	96.46
Average A ₃		18.86		99.78	12.39		99.91	7.48		98.42

doses of nitrogen have reduced the levels of crude fat, ash and NFE by 7.0%, 3.2% and 3.4% on average of all options.

Comparing data for oat grain chemical composition obtained in this investigation with tabular values reveals that they are higher. In tabular values (in dry substance) for crude protein on average 125 g/kg, crude fat - 51 g/kg, crude fiber - 121 g/kg, ash - 34 g/kg and 669 g/kg NFE, results obtained in the present study were higher by 1.8 to 21.5% for crude protein, by 11.1 to 29% for crude fat and by 17.5 to 32% for mineral substances. Only values obtained for NFE and tabular one are almost identical and the resulting fiber values were lower by 12.6 to 45% compared to tabular ones, which probably implies a higher digestibility of oat grains obtained by this technological scheme for soil and climatic conditions of Strandzha.

The results of the study show that the predecessor and

fertilization have not resulted in a significant change in the content of GE, ME and NE (Table 2). The content of GE increases with the increasing nitrogen fertilizer amount and is in the range from 18.58 MJ/kg to 19.01 MJ/kg of dry substance average for the period. Compared with tabular values these values are very close. The content of ME is the highest in nitrogen-free control and the lowest at the highest nitrogen rate and varies from 12.21 MJ/kg to 12.58 MJ/kg dry substance. Compared to tabular values these results are higher by 2.0 - 2.5%. The content of net energy (NE) for the conditions of test is within the limits of 7.33 MJ/kg to 7.60 MJ/kg of dry substance average for the period and decreases with increasing the nitrogen fertilizer rate. In accordance with the new system of energy nutritive value, the oat grain contains 1.24 food units for milk (FUM, kg) and 1.32 food units for growth (FUG, kg) and these values compared to

Table 3. Content of FUM and FUG -n/kg of dry substance, average for the period

Variants		FUM n /kg			FUG n /kg		
Predecessor (A)	Fertilization kg/ha (B)	Average	B % to A ₁ B ₀	B % to B ₀	Average	B % to A ₁ B ₀	B % to B ₀
Stubble A ₁	B ₀ (N ₀ P ₁₀₀ K ₅₀)	1.27	100.00	100.00	100.00	100.00	100.00
	B ₁ (N ₄₀ P ₁₀₀ K ₅₀)	1.25	98.42	98.42	98.42	98.51	98.51
	B ₂ (N ₈₀ P ₁₀₀ K ₅₀)	1.25	98.42	98.42	98.42	97.77	97.77
	B ₃ (N ₁₂₀ P ₁₀₀ K ₅₀)	1.22	96.06	96.06	96.06	94.81	94.81
Average A ₁		1.247		100.00	100.00		100.00
Sorghum A ₂	B ₀ (N ₀ P ₁₀₀ K ₅₀)	1.27	100.00	100.00	100.00	100.00	100.00
	B ₁ (N ₄₀ P ₁₀₀ K ₅₀)	1.25	98.40	98.40	98.40	98.51	98.51
	B ₂ (N ₈₀ P ₁₀₀ K ₅₀)	1.24	97.63	97.63	97.63	97.03	97.03
	B ₃ (N ₁₂₀ P ₁₀₀ K ₅₀)	1.23	96.85	96.85	96.85	95.55	95.55
Average A ₂		1.247		100.00	100.00		100.00
Rape A ₃	B ₀ (N ₀ P ₁₀₀ K ₅₀)	1.27	100.00	100.00	100.00	100.7	100.00
	B ₁ (N ₄₀ P ₁₀₀ K ₅₀)	1.25	98.42	98.42	98.42	98.51	97.79
	B ₂ (N ₈₀ P ₁₀₀ K ₅₀)	1.24	97.63	97.63	97.63	97.03	96.32
	B ₃ (N ₁₂₀ P ₁₀₀ K ₅₀)	1.22	96.06	96.06	96.06	95.55	94.85
Average A ₃		1.245		99.83	99.83		100.00

tabular values are higher by 0.8 to 4.9% for FUM and 2.3 - 5.4% for FUG (Table 3).

Conclusion

The studied predecessors stubble and rape increase the content of crude protein, crude fat and crude fiber in oat grain by 10.5 and 12.1%, 3.9% and 5.2, 5.6 and 1.2%. The content of minerals and NFE is highest after predecessor sorghum.

The increasing doses of nitrogen led to increasing the content of crude protein and fibers in grains on average by 14.4% and decreased the content of crude fat ash and NFE by 7.0%, 3.2% and 3.4% on average. The differences in the chemical composition of oat grains had not any major impact on its energy nutritive value expressed through GE, ME, FUM and FUG.

References

- Andrianov SN**, 2000. Influence of fertilization on productivity and quality of oats. Grain Plants, 3, 23- 25, (Ru).
- Antonova N and Dimov A**, 2002. Stability of oats specimen towards stem rust (P Gramines F avenae). Jubilee session, Sadovo, 96-99, (Bg).
- Iliev F, Kozelov L, Shindarska Z and Ignatova M**, 2004. Defining the energy and protein food value of the grain fodder. Scientific conference, Stara Zagora, 3, Stock-breeding, Veterinary medicine, 113- 117, (Bg).
- Savova T**, 2001. Influence of the agro technical factors over the growth, development and productivity of the winter oats in South-east Bulgaria. Doctoral thesis, (Bg).
- Savova T and Koteva V**, 1999. Influence of the mineral fertilizing over the biochemical content of the grain in two biotypes of oats.

Crop sciences, 5, 265-269, (Bg).

Shindarska Z and Ignatova M, 2001. Content and food value of some food sources. Stock-breeding Sciences, 1, 141-144, (Bg).

Todorov N, 1995. Norms about feeding and food value of the fodders for cattle and buffalos, 236, (Bg).

Todorov N, Djuvinov E, Tsvetanov I, Alexandrov A, Vladimirova L and Mitev Y, 2001. Manual for compiling recipes for compounded fodder and schemes for animal feeding (food value of the fodders), 302-314, (Bg).

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, IXth 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.



CONTENTS

Genetics and Breeding

- Grouping of determinate local tomato varieties on the basis of cluster analysis** 113
L. Krasteva, I. Ivanova, N. Velcheva

- Genetic diversity in Bulgarian Thoroughbred using microsatellite DNA markers** 116

G. Barzev, E. Zhelyazkov, V. Barzeva, D. Hristova, Zh. Sabev

- Evaluation of the stability and adaptability of the Bulgarian lavender (*Lavandula angustifolia* Mill.) sorts yield** 121

S. Stanev

Nutrition and Physiology

- Effect of dietary exogenous phytase supplementation in growing and fattening pigs** 124

A. Ilchev

Production Systems

- Designing lavender plantations in relation to the mechanized harvesting of lavender blossom** 131

K. Trendafilov, N. Delchev

- Economic evaluation of winter wheat leaf fertilization** 136

A. Stoyanova, I. Gospodinov, R. Petkova

- Effect of fertilization and predecessor on chemical composition and energy value of wintering oats grain** 139

M. Dimitrova – Doneva, R. Petkova

Agriculture and Environment

- Animal hygiene and ecological assessment of air pollution in a pig-farm** 143

G. Petkov, G. Kostadinova, R. Stefanova, T. Penev, P. Gercheva

- Variation in lipid abundance and composition in a fire affected hillside from Lyulin mountain, Bulgaria** 153

I. Atanassova, M. Teoharov

- Determination of minimum heat insulation thickness for an experimental methane fermentor** 160

R. Georgiev, K. Peychev, I. Simeonov, A. Alexandrov

- Theoretical study of absorption refrigeration system thermally activated by a vacuum pipe solar collector** 163

K. Peychev, R. Georgiev, D. Dimitrova