



ISSN 1313 - 8820
Volume 2, Number 2
June 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:

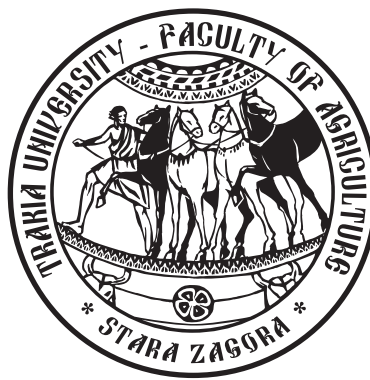
Agricultural Science and Technology
Faculty of Agriculture, Trakia University
Student's campus, 6000 Stara Zagora
Bulgaria
Telephone.: +359 42 699330
+359 42 699446
<http://www.uni-sz.bg/ascitech/index.html>

Technical Assistance:

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

ISSN 1313 - 8820

Volume 2, Number 2
June 2010



AGRICULTURAL SCIENCE AND TECHNOLOGY

2010

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



— PRODUCTION OF FRESH —
SAUSAGES AND OTHER MEAT PRODUCTS



*KEN...
Everywhere
you go*

KEN LTD
6000 Stara Zagora
www.ken.bg
for contacts:
+359 42 64 11 28
60 24 92
fax: +359 42 60 11 46



Nutrition and Physiology

Shelter policies in the management of canine aggression

A. Arnaudova^{1*}, I. Varlyakov²

¹ Department of Humanitarian and Science Subjects, Faculty of Education, Trakia University, 6000 Stara Zagora, Bulgaria

² Department of Animal Morphology, Physiology, Faculty of Agriculture, Trakia University, 6000 Stara Zagora, Bulgaria

Abstract. Like many countries Bulgaria has faced serious problems concerning the stray dog population dynamics. Today, municipal authorities widely apply the catch-castrate-release method which allows for free roaming dogs to be caught, vaccinated, castrated, tagged and subsequently released. Some of these dogs are reported to having exhibited aggressive behaviour and performed attacks on people and conspecific animals, which along with the increased number of incidents of domestic dog bites, requires further investigation into the displays and management of canine aggression. The current research has focused on the analysis of good international practices, the study of national legislation and a case study of two municipal shelters in Stara Zagora and Kazanlak respectively and their policies in coping with aggressive behaviour. Overall, results indicate that despite certain underlying common trends, there are also basic differences regarding the measures undertaken by shelter staff. Problems such as shortage of personnel and the lack of qualified animal behaviour experts and a standardized behaviour evaluation test impede progress work and make canine aggression management a hard task to achieve.

Keywords: canine aggression, stray dogs, shelters, management

Abbreviations: LVA – Law of Veterinary Activity, APA – Animal Protection Acts

Introduction

Without doubt dogs have been among the first animals to be domesticated by humans and throughout the years they have proven useful in various ways including hunting, guarding the herds of livestock, serving as police or rescue dogs, assisting people with disabilities, participating in animal assisted therapies or simply being companions and friends providing unconditional love for millions of people around the world. Yet, studies in recent years have found out that the rising number of stray dogs and unwanted pets constitutes a serious issue in society (Kdolsky, 2008). Animal shelters are overcrowded with dogs being either relinquished by their owners or found freely roaming the streets. Only a small percentage of these animals find a new home, whereas many of them are humanely euthanized. One of the main reasons for relinquishment (Salman et al., 1998; Orihel and Fraser, 2008) and euthanasia (Lepper et al., 2002; Orihel et al., 2005) proves to be failure of temperament testing and in particular displays of aggression towards other dogs and/or people. The relatively high growth of dog-bites inflicted on both children and adults (Guy et al., 2001; Bollen and Horowitz, 2008) adds to the problem of aggressive household pets and free ranging dogs and creates a strong anti-dog lobby. Citizens are concerned about their safety and health, aware of possible dangers such as incidental dog attacks, a risk of zoonotic diseases, environmental contamination, loud barking causing noise disturbance at night, etc. At the same time many non-government organizations work for the prevention of cruelty to animals trying to achieve a guarantee for their ethical treatment and welfare. In this line of thought, finding an effective and humane method for dealing with the problem requires a careful analysis of previous measures, as well as a thorough investigation into the question of behavioral testing and

management.

The goal of the current research is an analytical study of the policies of shelters concerning the management, control and eventual corrective intervention of canine aggression.

The goal is to be accomplished through the following tasks:

- Study of the international experience and good practices related to the management of dog shelters and the treatment of canine aggression.
- Analysis of the national legislative framework.
- Case study of two municipal dog shelters in Bulgaria and their policy in the management of aggressive behaviour.

Material and methods

The current project research was conducted in two stages. The first focused on the theoretical study of internet resources and printed materials including periodicals, reports, articles, books, presentations and legislative acts concerning stray dog population control and the exhibits and management of canine aggression among sheltered animals. The latter included a practical investigation into the activities and aggressive behaviour management of two relatively small municipal shelters in Stara Zagora and Kazanlak. Initial telephone conversations were held with each of the directors of the two dog shelters. On their consent to participate in the research, each of them was given a questionnaire to complete in order to determine the percentage of aggressive dogs entering the shelter for a period of one year including sex and breed characteristics and the shelter's policy towards aggressive animals. Policies were examined in terms of ways for observation, gathering of information and dog evaluation, types of corrective measure (if

* e-mail: annaarnaudova@abv.bg

any) undertaken by the shelter staff in the treatment and management of canine aggression and whether or not aggressive dogs were given for adoption or humanely euthanized.

The following methods were incorporated in the research implementation: literary analysis of printed materials; internet research into on-line data bases; interviews with shelter managers; questionnaires being distributed and completed; analysis and synthesis of the final results.

Methods employed in stray dog management

For many years attempts to solve the problem with stray dogs and unwanted pets were limited to the catching and subsequent euthanasia of the animals. This method was practiced in Italy, Brazil, India, Bulgaria and other countries. In the USA specially trained units were created. The initial results indicated a temporary decrease in population growth which was later compensated with the birth of a new generation of dogs which replaced those that had been caught and euthanized, thus creating a more serious problem and allowing for the growth of the population to reach the *holding capacity* of the environment – the number of animals that can be supported in an area depending on the availability of food, water and breeding grounds (BAS report, 2007; Krishna, 2008). The catch-and-kill method proved inefficient since the number of remaining animals would have a higher survival rate and numbers would finally level off.

According to a research conducted by Dr. Klaus Wagner in 2001 despite the fact that the number of dogs euthanized in the city of Sofia for the period 1998-2000 came to 10-15 thousand a year, the overall number of stray dogs remained relatively stable (Wagner, 2007).

In recent years one of the most successful ways for solving the problem with free roaming animals has become the catch-castrate-release method (Tomescu, 2008). This is a no-kill method that enables specialized services to catch stray dogs which are then spayed/neutered and subsequently returned to the same places where the animals have been initially picked up. All dogs are tagged and registered during the process, which allows for the tracking of their numbers. Priority measures suggested by the World Health Organization (WHO) include spaying of female dogs to avoid unwanted pregnancies and the rearing of young animals (BAS report, 2007).

Other good practices involve limiting of food resources (the use of specially designed closed rubbish containers, secured dung-hills, etc.); registration and identification of household pets (using microchips and other means to trace ownership and reduce the number of abandoned animals); free access to information and education of the public, etc.

Canine aggression management

Behavioral evaluation seems to be one of the most challenging tasks faced by shelter workers dealing with impounded canines. Assessing a dog's temperament can be a difficult, time-consuming and sometimes a risky undertaking. At the same time understanding a dog's "personality", a result of both genetic and environmental influences (Varlyakov, 1999; Ivanov et al., 2007) and certain endogenous and exogenous factors (Uzunova et al., 2007), is essential for a variety of reasons. It enables safe handling of the animal, determines the choice of suitable housing and kennel conditions, indicates probable adoptability and matching to an appropriate adopter, and last but not least, allows for eventual intervention and corrective measures in case of behavioral problems.

In evaluating canine behaviour some shelters rely solely on information provided by owners at relinquishment or animal patrol officers at intake, as well as on direct observation by staff (Reid et al.,

2004; Orihel et al., 2005). Others conduct behavioral assessment which includes testing for aggression towards people and conspecifics. According to Reid et al among simulated everyday events the most common are: friendly approach by a stranger; response to basic obedience commands; playing tug-of-war; approach by an unfamiliar dog; mock veterinary exam; removal of food bowl while the dog is eating, etc. (Reid et al., 2004). Although behavioral evaluation is performed by qualified animal behaviour experts due to the absence of a standardized behavior test or/and the unreliability of existing tests some animals might eventually escape detection of aggressive traits in their temperament and end up being placed for adoption. Possible explanations can be sickness, boredom or stress experienced by kennelled animals, as well as inability of the test to stimulate the dog's triggers for aggressive behaviour (Christensen et al., 2007; Bollen and Horowitz, 2008). Once diagnosed, aggressive behavior is managed by means of either humane destruction (euthanasia), or by implementation of rehabilitation techniques such as housing dogs individually, restricting visual contact with conspecifics, limiting handling to experienced staff, introducing a gradual step-by-step socialization process and applying a positive reinforcement strategy. Yet, due to differences in shelter policies, financial constraints, lack of time, lack of experienced shelter staff and a scientifically validated rehabilitation program, behaviour modification can be a hard task to achieve (Orihel et al., 2005). There is a need for long-term objectives, consistency and continued treatment to maintain the desirable behavioral change. (Reid et al., 2004; Orihel and Fraser, 2008). In Bulgaria, issues related to stray dogs and canine aggression have posed serious questions in society and are predominantly treated in animal welfare and veterinary practice legislations.

Bulgarian legislative framework in treating canine aggression

Up to the recent moment animal protection and welfare have been generally regulated by the Law on Veterinary Activity (LVA) and the Animal Protection Act (APA). Both laws deal with some issues concerning animal aggression.

Chapter VII of the Law on Veterinary Activity (2009) addresses questions related to the protection and humane treatment of animals. Section I article 150 postulates the main rights and responsibilities of pet owners, animal caretakers and shelter managers. Problems related to animal aggression are only partly discussed in Sections I and VII of the above chapter. Under article 150 (2) food and water bowls are required to be arranged in such a way as to minimize any triggering of aggressive competition among animals. Articles 151 (2) and 151 (3) respectively ban the use of animals for fighting and entertaining purposes which might inflict pain, suffering, damage or death upon the animal, as well as hounding dogs on one another. Meanwhile article 151 (15) of the law forbids housing together animals belonging to different or the same species when this may arouse aggression. The new Law on Veterinary Activity cancels the inhumane practice which allowed for the euthanasia of animals which had not been searched for by their owners during the obligatory two-week period stay and which prevented the stray animals from being released to their natural environment following the catch-castrate-release method. In accordance with the newly functioning law (article 179 (3)) euthanasia can be legally performed in one of the following cases: when animals suffer from an incurable disease, have undergone pathological changes and are subsequently experiencing pain and suffering; when attempts have been made to restrict the outspread of a contagious disease which jeopardizes the health of both people and animals; after the end of experimental work which has caused

the animals irreversible pathological changes, pain and suffering; in cases of *aggressive behaviour which puts human and animal lives in danger* (emphasis added). Article 177 (1) of the law obliges owners to walk their canines companions on leash and secure the dog with a muzzle in case of aggressive displays. In order to reduce the number of unwanted dogs roaming the streets and to control their population dynamics, the LVA, APA and the Local Tax and Fee Law exempt the owners of castrated pets from paying taxes thus encouraging the spaying and neutering of animals. In the LVA's Additional Decrees the term "aggressive dogs" is defined to refer to "dogs displaying a spontaneous abnormal reaction towards people or animals which, depending on the nature of its strength and character, can result in an inflicted injury or death" (LVA, 2009). At the same time the law does not explain who should be directly involved in solving the stray dog problem, neither does it provide clues as to who is supposed to evaluate canine behaviour and decide on whether a dog is actually aggressive and has to be humanely destroyed.

The new Animal Protection Act (2008), which has been in force since 31/01/2008, postulates the good practices in relation to animal welfare and determines public authorities', private citizens' and legal entities' responsibilities concerning animal protection and well-being. In compliance with Chapter IV owners of companion animals are obliged to prevent any displays of abnormal aggression which their dog might exhibit in public places or in situations threatening the life and health of both people and animals.

Ordinance № 39 (2009) determines the conditions necessary for the rearing of companion animals in accordance with their physiological and behavioral characteristics. Owners of companion animals are bound to rear them in such a way as to avoid the triggering of aggressive behaviour (article 7 (2)). The law bans the bringing together of animals exhibiting natural or acquired intolerance to each other (article 7 (4)). Furthermore, owners are obliged to exercise immediate control over their pets to secure the health and life of both people and animals. Sections II and VII require owners to seek professional help for their dogs in case behavioral problems arise. In section III special attention is paid to the collective rearing of animals and the measures necessary for the minimization of stress, aggression, undesirable fighting and copulation.

Since 01/07/2009 Ordinance № 41 (2009), issued by the Minister of Agriculture and Food has been in force. It sets the necessary requirements for places where pets are reared, bred and/or offered for sale and for animal shelters and hotels. Section III settles the questions about animal intake. Aggressive animals are to be seized and impounded within the next 24-48 hours of receiving the call. When relinquishing animals to shelters all owners are required to provide information about the animal's behavioral habits and pay for using the shelter's services. According to article 117, Section IV all sick and/or aggressive animals have to be kept separately. Staff members must keep records of the animals' conditions, behaviour and habits on a daily basis and if necessary inform a veterinarian. All the information is to be recorded in the animals' individual profile cards.

Local authorities are generally responsible for issues related to stray dogs and for the maintenance of municipal shelters. Currently Bulgaria has *Municipal Programmes for Stray Dog Population Control* (2008) and *Shelter Rules and Regulations*, and city councils have approved of *Orders for the Sequence and Conditions for the Rearing of Animals in Built-up Areas*.

Despite the existing legislative framework previous studies (BAS report 2007, Naydenov, 2008; Wagner, 2001) indicate that research into stray dog dynamics and the implementation of Bulgaria's national legislation has been confined mainly to the region

of Sofia. This deficiency in building an overall picture of the situation in the country paired with the need for investigating further into the matter of problematic behavioral management and aggressive behaviour in particular, calls for a more detailed analysis and a case study.

Case Study

Initially, managers and members of staff from 7 dog shelters in Bulgaria were contacted on the phone. The goals of the project were explained to them and they were asked to participate by answering the questions in the questionnaire. Since participation was entirely on a voluntary basis, only three out of the eight animal shelters agreed to take part after personal face-to-face talks with their directors. These were the stray dog shelters in Stara Zagora, Kazanlak and Dimitrovgrad. The questionnaires consisting of 15 questions were handed out to each of directors. The latter were subsequently contacted on the phone to clarify some of the answers provided and for additional information. The questions aimed to find out the nature of the facility (municipal, NGO's, privately owned, etc.), the number of animals passing the shelter for a period of one year – from 01/01/2008 to 01/01/2009 including those at intake, the number of animals being castrated, euthanized, adopted or having died or escaped from the enclosures. Only two of the three shelters (Stara Zagora and Kazanlak) were able to provide relevant information for the study period. It turned out that due to managerial changes in Dimitrovgrad shelter the register contained information which could be considered reliable for only half of the study period and therefore the third shelter was excluded from the investigation. Later on, in the subsequent comparative study between Stara Zagora and Kazanlak shelters the correlation between the overall number of animals and the number of animals with aggressive behaviour was brought into question along with sex and breed specific issues. Shelters were asked whether they would accept dogs with a known history of aggression and how they evaluated and observed dogs' behaviour on a daily basis. Furthermore, answers indicated whether problematic dogs with displays of aggression would be euthanized or placed for adoption. In those cases when they were not humanely destroyed, the questionnaire tried to find out whether the dogs were placed for immediate adoption (and if potential adopters were informed about their behavioral history) or whether the shelter staff intervened and tried to rehabilitate aggressive canines by undertaking corrective measures such as socialization and positive reinforcement. Participants were finally asked whether they believe that specialized training courses and working with animal behaviour experts would be beneficial for dealing with problematic canine behaviour in their shelter.

Outcomes

The two shelters are situated in urban areas in relatively close proximity to each other. Each of them is located in the outskirts of the city, away from public places and residential areas. The shelters were registered in accordance with the Law on Veterinary Activity, article 137 and have conducted their activities since 2005.

The shelter for stray and unwanted dogs in Stara Zagora is a strictly municipal shelter in Zora neighborhood functioning in compliance with LVA and APA, the Order for the Sequence and Conditions for the Rearing of Animals in Built-up Areas in force from 16/06/2008 and the Programme for Stray Dog Population Control in the Region of Stara Zagora Municipality. The shelter is responsible for the catching of stray dogs in the city of Stara Zagora with a territory of 85,786 sq km and a population of approximately 142, 000 citizens. The shelter employs 3 staff members and for the period of one year (01/01/2008 – 01/01/2009) it received 279 stray or unwanted dogs. 189 of them were castrated and returned to the

places where they had been initially caught following the catch-castrate-release method. 20 animals were adopted, 9 were lost or managed to escape, 35 puppies died of canine parvovirus and 26 animals were euthanized. Of the 26 humanely destroyed, 15 were dogs with displays of aggression towards humans or other animals and they were euthanized in accordance with article 179 (3) of LVA.

Kazanlak shelter for stray and unwanted dogs is supported by an Austrian-Bulgarian non-government animal foundation. The shelter is also a municipal entity under the regulations of LVA and APA, the Order for the Sequence and Conditions for the Rearing of Animals in Built-up Areas in Kazanlak Municipality and the Programme for Stray Dog Population Control in the Region of Kazanlak Municipality. The shelter has 2 employees and serves the needs of the town of Kazanlak with a territory of 36,067 sq km and a population about 51,000. For a period of one year (01/01/2008 – 01/01/2009) 298 animals entered the shelter. 277 of them were castrated and released, 8 were adopted and 1 dog was euthanized as a result of a severe skin condition. The shelter staff admits that there were death casualties among the puppies but since the dogs were too young these incidents were not statistically recorded. 3 dogs were considered missing or lost and 5 animals showed obvious

signs of aggression. Of the 5 aggressive dogs 4 were adopted for the purpose of serving as guard dogs and the fifth remained in the shelter due to its complete loss of sight.

Table 1 below represents the data information from the registers of the two stray dog shelters. The analysis of the results indicates that there is a successful implementation of the catch-castrate-release method in the two shelters, the results being higher in Kazanlak with 277 animals (93 %) compared to the stray dog shelter in Stara Zagora with 189 (67,8%) animals respectively (Figure 1A). The latter has a higher percentage of adopted dogs - 7,2 % whereas the shelter in Kazanlak has 2,7 % of adopted animals. (Figure1B). Meanwhile Stara Zagora has a bigger number of euthanized dogs – 9,3 % whereas in Kazanlak the per cent is 0,3 % (Figure 1C).

The research has found out that the two municipal shelters differ in their policies in the management of canine aggression (Table 2). While they both follow the procedure of confining aggressive animals to individual kennels and avoid placing them in proximity with other conspecifics in compliance with article 151 (15) of LVA and article 117, Section IV of Ordinance 41, the application of other measures varies significantly. Restricting visual contact between the aggressive dog and the rest of the dogs in the shelter is a corrective

Table 1. Traceability of dogs according to shelter registers

Parameter / Shelter	Stara Zagora		Kazanlak	
	Number	%	Number	%
Castrated and released	189	67.8	277	93.0
Adopted	20	7.2	8	2.7
Died	35	12.5	-	0.0
Euthanized	26	9.3	1	0.3
Lost or missing	9	3.2	3	1.0
Returned to previous owners	-	0.0	1	0.3
Currently at the shelter	-	0.0	8	2.7
Total number of animals	279	100	298	100

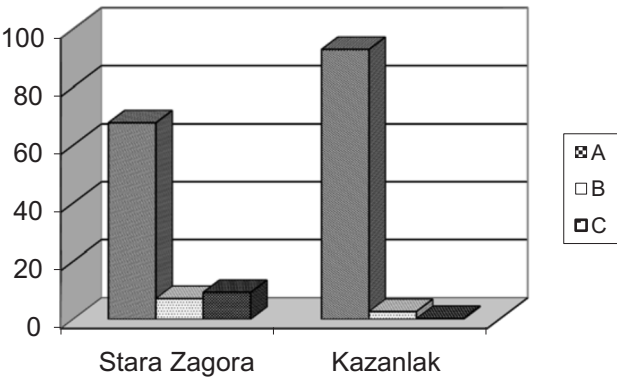


Figure 1. Relation between the number of castrated/ released, adopted and euthanized dogs
A – Castrated, vaccinated and released
B - Adopted
C - Euthanized

Table 2. Methods applied in aggressive behaviour management

Methods	Stara Zagora	Kazanlak
Keeping animals individually	+	+
Restricting visual contact		+
Ethologist's advice		
Behaviour modification		
Euthanasia	+	
Adoption		+

method practiced in Kazanlak whereas the director of the other shelter admits that due to the nature of kennel construction, as well as the number of animals, visual constraint is not an option. The difference in the construction of the premises and their conditions is consistent with the findings of Uzunova et al. (2008) who also reports of daily ethological observations conducted by the staff but in her findings, as well as in our study, there is an evident lack of expertise animal behaviour specialists. No test is performed to evaluate the temperament of aggressive dogs and because of the risk involved in working with such dogs a decision has been made in the facility in Stara Zagora in favour of the humane destruction of the animals. The euthanasia was in all cases performed in accordance with the law by a licensed veterinarian.

Both shelters agree that due to the lack of specialized help they faced difficulties in managing canine aggression. They did not seek advice from animal behaviour experts because they did not know who to ask for assistance. Daily observations were conducted by the people working at the shelter during the time of feeding the animals and cleaning the kennels. There was no professional help at hand and a decision on a dog's euthanasia was taken by the shelter's veterinarian.

In the shelter in Kazanlak aggressive dogs were placed for adoption after the animals had been castrated. Follow-up interviews with the managers revealed that in those cases potential adopters were closely interviewed and then thoroughly informed of the behaviour of the dog as well as the post adoption risks involved. Potential owners were then asked to sign a written declaration before adopting the dog. Out of the 5 aggressive dogs in Kazanlak 4 were placed for adoption and were subsequently taken by people

who needed guard dogs to protect their herds or property. Up to the present moment none of the adopted animals has been returned to the shelter by its new owner. The fifth dog remained in the kennel due to its complete lost of sight and is still cared for by the staff.

Other findings of the research indicate that there are certain sex and breed-specific characteristics related to canine aggressive behaviour (Table 3). In comparison to females, male dogs are more prone to aggressive displays. Of the 20 dogs with aggressive behavior, 14 dogs were intact males, which comprise 70 % of the overall number of aggressive canines. Subsequent interviews with the shelter managers show that in some of these dogs there is a decrease in aggressive displays following the dog's neutering (Ivanov et al., 2007). Most of the aggressive animals were mongrels - 17 and only three were pure-bred dogs. Of the latter there were representatives of the following breeds – doberman, Bulgarian shepherd dog and mastiff. According to dog experts these are guard dogs which are highly protective and can easily develop aggressive behaviour as a result of selective breeding and training (Atanasov, 1998; Varlyakov, 1999; Boykovski, 2008).

Further discussions on the provided answers show that most of the 20 aggressive dogs (17 – 85%) were aggressive both towards humans and other dogs. Unfortunately, since most of the dogs were stray animals, shelter staff had no information at the intake of the animal as to the situations triggering aggressive displays, the dog's living conditions or any other indicators that might help at assessing the dog's behaviour. In only one case (a mastiff in Kazanlak) additional information was provided by the owner at the time of the dogs' relinquishment. The mastiff was brought to the shelter by a person who admitted that he was unable to take care of the animal

Table 3. Sex and breed-specific displays of aggression

Shelter	№ aggressive animals	Male	Female	Pure-bred	Mongrels
Stara Zagora	15	10	5	-	15
Kazanlak	5	4	1	3	2
Total	20	14	6	3	17

because of his aggressive nature.

Finally, respondents to the questionnaire were asked whether they believed that working with experienced animal behaviour experts and the development of specialized training courses and behaviour evaluation programs would help the management of canine aggression. The three interviewees answered affirmatively and voiced their concern for the lack of qualified ethologists, insufficient number of personnel and the absence of special programs for assessing dog's behaviour.

Discussion

There is an evident trend towards embracing the new, more humane method of catch, castrate and release, which allows for dogs to be caught and subsequently spayed/neutered, tagged and vaccinated before they are returned to their living grounds. This tendency ends up the previously applied strategy of killing all animals that have not been claimed by their owners. For the shelters in Kazanlak and Stara Zagora, the percentage of dogs which were caught and released amounts to more than 2/3 of the overall number of animals entering the shelter. According to the findings of this

research both municipal shelters accept aggressive dogs and most of these animals are strays (with only one aggressive dog being relinquished by its owner). However, the shelters' policies differ as to whether these dogs are euthanized or placed for adoption. The municipal shelter in Stara Zagora has a policy of humanely destroying all aggressive animals whereas the shelter in Kazanlak may offer such dogs for adoption. Conversations with the facilities' directors revealed that all animals were castrated and that in some cases there was a considerable improvement in the dog's behaviour following their spaying/neutering. Yet, many of the dogs remained aggressive towards both people and other dogs proving that aggression is not something that can be easily altered by surgical operations. The research found out that most of the aggressive dogs were male and that aggression was also genetically predetermined and might be expected among representatives of certain dog breeds.

In line with these results, the questionnaire outlined some adoption tendencies in Bulgaria compared to other European countries. First, there is still very little interest in the general public in adopting stray animals from shelters - with the number being well below 10 %. Second, there are people in Bulgaria who would take the risk of adopting aggressive animals for the purpose of using them

as guard dogs of their properties unlike the situation in other countries where canines who have failed a temperament test are not offered for adoption. Unfortunately, besides signing a written declaration on adopting the animals, the new owners of aggressive dogs were not subsequently contacted by the shelter staff and no follow-up information of the dog's behaviour and conditions was present at the time of the research.

It turned out that there was no scientifically approved test of behaviour evaluation functioning in the country and that there was no actual assessment of the dog's behaviour performed by qualified animal behaviour experts. In fact, no such experts were contacted or consulted in the management of aggressive behaviour because the shelters' personnel were unaware as to whether such certified specialists exist. The staff relied on employees' daily subjective observations of the animals. The only management technique involved was restricting visual contact with other conspecific animals in Kazanlak shelter. Though the shelter decided to give aggressive animals a second chance by placing them for adoption, no corrective behaviour measures were undertaken to achieve behaviour modification. Thus, the animals are at high risk of exhibiting aggressive behaviour in the post-adoption period and remain potentially dangerous to both human and animals.

Finally, both shelters agree that special programmes and additional training concerning dog behaviour will be beneficial for both the personnel and the animals at the shelters.

Conclusion

Although the two municipal shelters differ in their treatment and management of canine aggression there are some common problems such as a shortage of staff, lack of standardized evaluation tests and a serious need of experienced and well-trained animal-behaviour specialists to help in assessing dogs' behaviour. Though the role of such specialists is strictly defined in the national legislation (Ordinance 41 § 1 (8)), they are not yet functioning in Bulgarian society as expected. An expertise use of qualified help from professionals and the application of a unified objective behaviour assessment test will improve the identification of animals that may be potentially dangerous and those that may be easily placed for adoption. Shelters might also think of employing the services of volunteers to help solve staff deficiency problems, as well as looking for opportunities to enhance the training and knowledge of their personnel. Such measures are essential both for the safety of people involved and the welfare and proper treatment of the animals. Long-term studies on a wider range are also warranted for determining the stray dog population situation in Bulgaria and the practices in the treatment of canine aggression.

References

Atanasov N, 1998. In the world of the German shepherd dog. Zhivotno Publishing house, Sofia, (Bg).
Boykovski S, 2008. How to train the dog. Sofia: Enyovche, (Bg).
Animal Protection Act (State Gazette 13 from 08/02/2008, in force since 31/01/2008, (Bg).
Bulgarian Academy of Science report on the problems of stray dog population in Sofia municipal region, 2007, (Bg).
Bollen KS and Horowitz J, 2008. Behavioral Evaluation and

Demographic Information in the Assessment of Aggressiveness in Shelter Dogs. *Applied Animal Behaviour Science*, 112, 120-135.
Christensen E, Scarlett J, Campagna M and Houpt KA, 2007. Aggressive behavior in adopted dogs that passed a temperament test. *Applied Animal Behaviour Science*, 106, 85-95
Guy NC, Luescher UA, Dohoo SE, Spangler E, Miller JB, Dohoo, IR and Bate LA, 2001. A Case Series of Biting Dogs, Their Behaviour and Their Victims. *Applied Animal Behaviour Science*, 74, 43-57.
Ivanov R, Simeonovska-Nikolova D and Delov V, 2007. Foundations of Ethology and Physiology of Behaviour. St. Kliment Ohridski Publishing house, Sofia pp 26, 36, 47, (Bg).
Kdolsky A, 2008. Welcoming Speech. In: Second Conference on Animal Welfare: Systematic and Science-based Solutions for the Management of Stray Dogs in Europe, 7-8 October 2008, Brussels, p.12.
Krishna S, 2008. Animal birth control in India – best practices with humane methods and without killing stray animals. In: Second Conference on Animal Welfare: Systematic and Science-based Solutions for the Management of Stray Dogs in Europe, 7-8 October 2008, Brussels, 17-18.
Law on Veterinary Activity, 2009. Last update State Gazette from 15/09/2009), (Bg).
Lepper M, Kass PH and Hart LA, 2002. Prediction of adoption versus euthanasia among dogs and cats in a California animal shelter. *Journal of Applied Animal Welfare Science*, 5(1), 29-42.
Naydenov M, 2008. Implementing Legal Frameworks – First Results of the Stay Animal Program in Bulgaria. In: Second Conference on Animal Welfare: Systematic and Science-based Solutions for the Management of Stray Dogs in Europe, 7-8 October 2008, Brussels, p. 24.
Ordinance № 41 from 10/12/2008 about the requirements for places where pets are reared, bred and/or offered for sale and for animal shelters and hotels. (State Gazette 1 from 06/01/2009), (Bg).
Ordinance № 39 from 01/12/2008 about the conditions necessary for the rearing of companion animals in accordance with their physiological and behavioral characteristics (State Gazette 1 from 06/01/2009), (Bg).
Orihel JS, Ledger RA and Fraser D, 2005. A survey of the management of inter-dog aggression by animal shelters in Canada. *Anthrozoös*, 18 (3).
Orihel JS and Fraser D, 2008. A note on the effectiveness of behavioral rehabilitation for reducing inter-dog aggression in shelter dogs. *Applied Animal Behaviour Science*, 112, 400-405.
O'Sullivan EN, Jones BR, O'Sullivan K and Hanlon AJ, 2008. The Management and Behavioral History of 100 Dogs Reported for Biting a Person. *Applied Animal Behaviour Science*, 114, 149-158.
Programme for Stray Dog Population Control in the Region of Stara Zagora Municipality, Decision № 13 from 26/06/2008 of the City Council-Stara Zagora, (Bg).
Reid P, Goldman J and Zawisowski S, 2004. Animal shelter behaviour programs. In: *Shelter Medicine for Veterinarians and Staff* (eds. L Miller and S Zawistowski), Blackwell Publishing, 317-331.
Report on Article 93 from the Book of Regulation Concerning the Organization of the City Council Activity about Accepting a Programme for Stray Dog Population Control in the Region of Kazanlak Municipality from 26/08/2008, (Bg).
Salman M, New JG, Scarlett JM, Kass, PH, Ruch-Galiev R and Hetts S, 1998. Human and animal factors related to the relinquishment of dogs and cats in 12 selected animal shelters in the United States. *Journal of Applied Animal Welfare Science*, 1(3), 207-

Tomescu IS, 2008. Vier Pfoten – stray dog programs in Eastern Europe. In: Second Conference on Animal Welfare: Systematic and Science-based Solutions for the Management of Stray Dogs in Europe, 7-8 October 2008, Brussels, 17-18.

Uzunova K, Miteva Ch, Mitev Y and Bivolarski B, 2007. Adaptation and Behaviour in Animals – Indicators of their Welfare. Trakia Journal of Sciences, 5, 2, 16-18.

Uzunova K, Stoyanchev T, Iliev A, Miteva Ch, Mitev Y and

Stoycheva I, 2008. Comparative Veterinary Hygienic Evaluation of Stray Dog Shelters and Their Categorization. Trakia Journal of Sciences, 6, 1, 27-32.

Varlyakov I, 1999. Dog Behaviour. In: Animal Behaviour (eds. A Petkov, E Enev, K Sivkova, I Varlyakov and N Oblakov), KOTA Publishing house, Stara Zagora, 161-185, (Bg).

Wagner K, 2007. Report on the decrease of stray dog population in the city of Sofia, (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 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.



CONTENTS

Genetics and Breeding

- Influence of various cryoprotectants on the sperm mobility of Muscovy semen before and after cryopreservation** 57
V. Gerzilov

61

Adaptive possibility and yield stability of varieties of oil-bearing roses

N. Kovatcheva, K. Rusanov, I. Atanasov

Nutrition and Physiology

Shelter policies in the management of canine aggression

A. Arnaudova, I. Varlyakov

64

Production Systems

Daily dynamics of the essential oils of *Rosa damascena* Mill. and *Rosa alba* L.

A. Dobрева, N. Kovacheva

71

Effectiveness of the insecticide "Mido 20 SL" in the fight with the green rose aphid populations (*Macrosiphum Rosae* L)

H. Lambev

75

Potassium fertilization on cotton

G. Panayotova, N. Valkova

78

Agriculture and Environment

Microbial communities in areas affected by formation of calcrete in the Thracian plane

S. Bratkova, K. Nikolova, K. Gesheva

84

An approach for Fusarium infected corn kernels recognition using linear discrete models

P. Daskalov, V. Mancheva, Ts. Draganova, R. Tsonev

90

Mechanism-based category formation of aldehydes for acute aquatic toxicity and mutagenicity

Y. Koleva

96

Quality and Safety

Gas-chromatography and organoleptic analysis of the essential oil of *Agastache foeniculum* (Pursh.) Kuntze

G. Zhekova, A. Dzhurmanski, A. Dobрева

102

Comparative studies on the fatty acid composition of White brined cheese, marketed in the town of Stara Zagora

N. Naydenova, K. Davidova, T. Iliev, G. Mihaylova

105