UNIVERSITY OF AGRICULTURAL SCIENCE AND VETERINARY MEDICINE BUCHAREST

FACULTY OF ANIMAL SCIENCE

DOCTORAL THESIS

"RESEARCH CONCERCNING RABBITS BEHAVIOUR AS THEIR WELFARE INDEX IN DIFFERENT MICROCLIMATE CONDITIONS"

Scientific Coordinator :

Prof. Ph.D.

Elena Popescu-Micloșanu

PhD student:

Eng. Nicolae Stanciu

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DOCTORAL THESIS SUMMARY

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The doctoral thesis « Research concerning rabbits bahaviour as their welfare index in different microclimate conditions » elaborated by PHd candidate eng. Nicolae Stanciu, under the coordination of PHd Professor eng. Elena Popescu-Micloşanu, is made of two parts , structured in 10 chapters, including general conclusions and recommendations , to which one added the studied bibliography. The doctoral thesis comprises totally 255 pages, out of which the first part, Bibliographical research comprises 72 pages (it represents 29.00 % of the work),and the second part, Personal Research has 183 pages (71.00 %of the work). There are included 76 tables, 42 figures and 140 bibliographical titles.
The first part is structured in 5 chapters and it represents a synthesis of the speciality literature related to the topic of the doctoral thesis , and the second part comprises personal research on adult and young rabbits rabbit behaviour belonging to the White New Zealand and Californian breeds and it is structured in 5 chapters to which one added the selective bibliography.

The research unfoldement place, studied biological material, natural climate and microclimate conditions inside the shelter and the working methodology.

Research was unfolded in a private rabbit farm, located in Tomșani locality, Prahova county.
The studied biological material was represented by New Zealand white and Californian adult rabbits, as well as young rabbits found in the 1st -10th farming week (after the weaning).
The objectives of the research proper to the experiment no.1 were, on one hand, the establishment of different season microclimate conditions influence , of animals breed and sex over the rabbits behavioral manifestations.
The research proper to experiment no.1 took place during 20 days along the four yearly seasons , starting with summer. There have been observed and noted on a specially conceived record card the behaviour of 16 adult male and female rabbits during 08.00-18.00 every day.
The objectives of the research proper to the experiment no.2 were the establishment of the rabbit young rabbits age and breed influence on the New Zealand white and Calfornian weaned young rabbits different behavioral manifestations .The research was centred on 24 New Zealand white and Calfornian young rabbits. The hourly remarks were noted in specially conceived record cards, too.
For experiment no.1. the medium temperature and the medium relative moisture inside the shelter were of 27.7 ° C and 46 % in summer (25.73 ° C and 77.27 % outside the shelter), 22.14 ° C and 55.8 % in autumn (17.49 ° C and 66 % outside the shelter), 14.26 ° C și 72.2 % in winter (8.66 ° C și 89.33 % outside the shelter) și 21.10 ° C și 64.83 % in spring (17.33 ° C și 88.03 % outside the shelter),.
For the experiment no.2 the medium temperature and the medium relative moisture during the experiment was of 21.32 ° C and 68.58 % during 1- 4 farming weeks after the weaning (19.33 ° C and 77.56 % outside the shelter) and 20.66 ° C and 58.69 % during 5-10 farming weeks after the weaning (23.21 ° C și 71.88 % outside the shelter).

The main data achieved in both experiments were processed by means of Microsoft Excell 2007, and for the etablishment of the differences significance among different behavioral manifestations , there were used the variance analysis, Fisher and Tukey and Student tests .

Results and their discussion within experiment no.1: « Research concerning behavioral manifestations depending on the microclimate conditions for New Zealand white and Californian rabbits»

The total number of behavioral manifestations depending on the daily medium number of New Zealand white and Californian adult rabbits behavioral manifestations , recorded in the microclimate conditions recorded in the four studied seasons reached the number of 5486.4 remarks, among which 2574.2 for the New Zealand white breed and 2912.2 for Californian breed.

Out of the total of the two breeds behavioral manifestations , there were recorded 1433.2 remarks during summer (26.12 %), 1306.4 observații în sezonul de toamnă (23.81 %), 1480.2 remarks during winter (26.98 %) and 1266.6 remarks during spring(23.09 %).

In summer, recorded activity behavioral manifestations were more numerous for the New Zealand white rabbits with 2.03 %, The rest behavioral manifestations in different positions were with 3.47 % more that in the case of Californian rabbits, while abnorbal behavioral manifestations were more numerous with 5.50 % for Californian breeds in comparison with the New Zealand white breeds.

In autumn , behavioral manifestations had almost the same frequency for the rabbits belonging to the two breeds , the differences being insignificant (0.76 for activity behaviours , 0.21 % for rest behaviours , 0.95 % for abnormal behaviours in favour of the New Zealand white rabbits).

Activity behavioral manifestations in winter were higher with New Zealand white rabbits, namely with 9.59 %, rest behavioral manifestations in different positions were 0.44 % higher for the Californian rabbits than for the New Zealand white rabbits, while abnormal behavioral manifestations were higher with 9.15 % for Californian rabbits in comparison with New Zealand white rabbits.

Activity behavioral manifestations in spring were higher with New Zealand white rabbits, namely with 4.12 %, rest behavioral manifestations in different positions were with 1.27 % higher for the Californian rabbits than for the New Zealand white rabbits, while abnormal behavioral manifestations were higher with 2.85 % for New Zealand white rabbits in comparison with the Californian ones.

Analysing the medium behavioral manifestations of the two breeds behaviours , without taking into account the animals sex , one may notice a breed influence over their different proofs , namely their activity and rest in different positions behavioral manifestations were higher with the Californian rabbits (2.09 % for the activity behaviours and with 1.55 % for the rest behaviours), while the abnormal behaviours proofs (with 3.64 %).

Hour medium frequency of behavioral manifestations on activity group depending on season, breed and sex for New Zealand white and Californian adult rabbits

In summer, during the studied period, it was recorded an hour medium frequency of activity behaviours for New Zealand white males equal to 0.98 ± 0.03, while the Californian males had an hour medium frequency equal to 1.00 ± 0.05, with 2 % lower for New Zealand white males in comparison with the Californian males. The rest behaviours in different positions recorded an hour medium frequency equal to 1.16 ± 0.03 f or New Zealand white males, frequence which

was with 7.76 % higher than the one recorded with the Californian males (1.07 ± 0.02). Abnormal behaviours had a higher hour medium frequency with 50.7 % for New Zealand white males (0.75 ± 0.06) in comparison with the Californian males. (0.37 ± 0.16).
In case of females, there was recorded an hour medium frequency of activity behaviours for New Zealand white females equal to 1.02 ± 0.03, while the Californian females had an hour medium frequency equal to 1.17 ± 0.01, with 12.82 % lower for New Zealand white females in comparison with the Californian males. The rest behaviours in different positions recorded an hour medium frequency equal to 1.10 ± 0.02 for New Zealand white females, frequence which was with 17.27 % higher than the one recorded with the Californian females (0.91 ± 0.01). Abnormal behaviours had a higher hour medium frequency with 74.44 % for Californian females (1.25 ± 0.03) in comparison with New Zealand white females(0.32 ± 0.01).
In autumn, during the studied period, it was recorded an hour medium frequency of activity behaviours for New Zealand white males equal to 0.81 ± 0.09, while the Californian males had an hour medium frequency equal to 0.94 ± 0.06, with 13.83 % lower for New Zealand white males in comparison with the Californian males. The rest behaviours in different positions recorded an hour medium frequency equal to 0.96 ± 0.01 for New Zealand white males, frequence which was with 11.11% lower than the one recorded with the Californian males (1.08 ± 0.06). Abnormal behaviours had a higher hour medium frequency with 71.74 % for New Zealand white males (0.46 ± 0.02) in comparison with the Californian males. (0.13 ± 0.03).
In case of females, there was recorded an hour medium frequency of activity behaviours for New Zealand white females equal to 1.11 ± 0.08, while the Californian males had an hour medium frequency equal to 0.94 ± 0.06, with 15.32 % lower for Californian females in comparison with the New Zealand white females. The rest behaviours in different positions recorded an hour medium frequency equal to 1.11 ± 0.01 for New Zealand white females, frequence which was with 6.72 % lower than the one recorded with the Californian females (1,19 ± 0.02). Abnormal behaviours had a higher hour medium frequency with 70.59 % for New Zealand white females (0.35 ± 0.03) in comparison with Californian females (0.85 ± 0.03).
In winter, during the studied period, it was recorded an hour medium frequency of activity behaviours for New Zealand white males equal to 1.04 ± 0.05, while the Californian males had an hour medium frequency equal to 0.89 ± 0.10, with 14.42 % lower for Californian males in comparison with the New Zealand white males. The rest behaviours in different positions recorded an hour medium frequency equal to 1.22 ± 0.03 for New Zealand white males, frequence which was with 2.4% lower than the one recorded with the Californian males (1.25 ± 0.06). Abnormal behaviours had a higher hour medium frequency with 25 % for New Zealand white males (0.68 ± 0.07) in comparison with the Californian males. (0.51 ± 0.12).
In winter , for the studied females, there was recorded an hour medium frequency of activity behaviours for New Zealand white females equal to 1.14 ± 0.03, while the Californian males had an hour medium frequency equal to 1.36 ± 0.02, with 6.18 % lower for California New Zealand white females in comparison with Californian females. The rest behaviours in different positions recorded an hour medium frequency equal to 1.32 ± 0.02 for New Zealand white females, frequence which was with 26,52% higher than the one recorded with the Californian females (0.97 ± 0.02). Abnormal behaviours were recorded only with Californian females (0.78 ± 0.04, hour medium frequency).
In spring, during the studied period, it was recorded an hour medium frequency of activity behaviours for New Zealand white males equal to 1.04 ± 0.05, while the Californian males had an hour medium frequency equal to 0.89 ± 0.10, with 14.42 % lower for Californian males in

comparison with the New Zealand white males. The rest behaviours in different positions recorded an hour medium frequency equal to 0.91 ± 0.02 for New Zealand white males, frequence which was with 6.19% lower than the one recorded with the Californian males (0.97 ± 0.01). Abnormal behaviours had a higher hour medium frequency with 78.95 % for New Zealand white males (0.38 ± 0.03) in comparison with the Californian males. (0.08 ± 0.01). In case of the studied females, there was recorded an hour medium frequency of activity behaviours for New Zealand white females equal to 1.10 ± 0.03, while the Californian males had an hour medium frequency equal to 1.24 ± 0.01, with 11.29 % lower for New Zealand white females in comparison with Californian females. The rest behaviours in different positions recorded an hour medium frequency equal to 1.19 ± 0.01 for New Zealand white females, frequence which was with 7.75% higher than the one recorded with the Californian females (1.29 ± 0.01).

Abnormal behaviours were recorded only with Californian females (0.59 ± 0.24, hour medium frequency).

For the New Zealand white rabbits, during autumn, the activity and rest behavioral manifestations present a decrease in comparison with the summer season and an increase in comparison with the winter season. Abnormal behaviours present a significant decrease in autumn, winter and especially in spring in comparison with summer.

For the Californian rabbits, during autumn, winter and spring , the activity and rest behavioral manifestations present a decrease in comparison with the summer season(however lower in comparison with the New Zealand white rabbits) , the decrease being higher in spring. Abnormal behaviours present a significant decrease in autumn, winter in comparison with summer.

Comparing the New Zealand white studied females with the Californian ones, one may conclude that the number of feeding, watering, dejection, liking cleaning,humpback position, sitting on the backward side sessions is similar for the two breeds females.

In case of New Zealand white females, one may notice a lower representation than in the case of Californian females for the following sessions: urinating, cage exploring (with 36.48%), careful standing (with 53.73%), scratching hygiene behaviour, resting positing in backward standing, squatted and lied on the chest or one side (the last with 18.58%). Besides, they don't show a series of abnormal behaviours like cage biting , cercle walking around the cage , cercle walking and it seldom presents stereotypies (with 75.95%) and floor scratching (with 48.85%).

Comparing the New Zealand white studied males with the Californian ones, one may conclude that the number of feeding, cage exploring, resting positing in bachward standing, lied on the chest and floor scratching is similar for the two breeds males.

For New Zealand white males, we may notive a less frequent manifestation than in the case of the Californian males for the following sessions : watering, dejection, urinating, smelling (with 30.35%), resting positing in backward standing, humpback and squatted (the last one with 14,31%) and cage bars biting behaviour (with 65%). But it shows more frequently careful standing behaviour (with 47.18%), scratching hygiene, chest lying and abnormal behaviours of walking round the cage (with 65.75%), spinning (with 16.87%) and different stereotypies (with 80%).

For average rabbits behavioral manifestations , without taking into account the animals sex, one may notice a breed influence over their different manifestations , namely their activity and rest proofs in different positions were higher with the Californian rabbits (with 2.09 % for activity behaviours and with 1.55 % for rest behaviours), while abnormal behavioral manifestations were higher with the New Zealand white rabbits în (with 3.64 %).

Results and their discussion in the experiment no.2 : „Research concerning behavioral manifestations depending on the microclimate for the New Zealand white and Californian young rabbits"

After the effected research, during ten hour periods , along 3 week study days , out of the 10 weeks, the experiment length , it was established a total number of behavioral manifestations equal to 10104.4, out of which 5791.2 represent remarks on the New Zealand white rabbits and 4313.2 remarks on the Californian rabbits. Also, out of the 10104.4 behavioral manifestations for the two breeds young rabbits, 55.41 %, represent activity behavioral manifestations, 38.25 %, represent rest behavioral manifestations in different positions, and 6.34 %, represent abnormal behavioral manifestations.

In the studied period , for the White Neozeeeland rabbits , the activity behavioral manifestations was equal to 0.89 ± 0.01, the medium rest behavioral manifestations in different positions was equal to 1.25 ± 0.01, while those of abnormal behaviour was equal to 0.26 ± 0.001.

In the studied period , for the Californian rabbits young rabbits , the medium activity behavioral manifestations was equal to 0.68 ± 0.01, the medium rest behavioral manifestations in different positions was equal to0.90 ± 0.02, while those of abnormal behaviour was equal to 0.17 ± 0.01.

The differences among the behavioral manifestations averages of the 10 study weks for the young rabbitss belonging to the two breeds were distinctly significant concerning activity and rest behaviours and very significant concerning abnormal behaviours.

Significant or very significant differences among behavioral manifestations show a significant breed influence on the weaned young rabbits , even if it is about activity behaviours, rest or abnormal behaviours. Also some differences among the two breeds young rabbits behavioral manifestations are really high as value but insignificant as it resulted from the effected statistical calculus.

For the New Zealand white young rabbits, the activity behaviours had a percent of 54.06 % in the first farming week after weaning , of 52.64 % in the second week, of 51.15 %, in the third week , of 46.24 % in the fourth week ,of 56.13 % in the fifth week ,of 56.28 % in the sixth week ,of 55.44 % in the seventh week , de 55.48 % in the eigth week ,of 56.90 % in the ninth week and of 58.80 % in the tenth week.

For the Californian young rabbits, the activity behaviours had a percent 60.05 % in the first farming week after weaning , of 52.49 % in the second week ,of 56.32 %, in the third week , of 55.99 % in the fourth week , of 55.23 % in the fifth week ,of 57.42 % in the sixth week ,of 59.66 % in the seventh week, of 53.16 % in the eigth week , of 57.94 % in the ninth week and of 57.42 % in the tenth week.

For the New Zealand white young rabbits, the rest behaviours in different positions had a percent of 38.27 % in the first week after weaning, of 40.40 % in the second week , of 41.92 %, in the third week, of 44.84 % in the fourth week , of 39.25 % in the fifth week , of 38.26 % in the sixth week, of 38.59 % in the seventh week , of 36.92 % in the eigth week, of 36.32 % in the ninth week and of 34.53 % in the tenth week.

For the Californian young rabbits, the rest behaviours in different positions had a percent of 35.26 % in the first week after weaning, of 43.36 % in the second week, of 38.96 %, in the third, of 39.41 % in the fourth week , of 36.04 % in the fifth week , of 36.31 % in the sixth week

, de 36.25 % in the seventh week , of 38.83 % in the eigth week ,of 34.36 % in the ninth week and of 35.62 % in the tenth week.
For the New Zealand white young rabbits, the abnormal behaviours had a percent of 7.67 % in the first week after weaning, of 6.96 % in the second week, of 6.94 %, %, in the third week, of 8.92 % in the fourth week, of 4.74 % in the fifth week, of 5.46 % in the sixth week, of 5.97 % in the seventh week, of 7.60 % in the eigth week, of 6.78 % in the ninth week, of 6.67 % in the tenth week.
For the Californian young rabbits, the abnormal behaviours had a percent of 4.69 % in the first week after weaning, of 4.15 % in the second week , of 4.72 in the third week, of 4.60 % in the fourth week, of 8.74 in the fifth week, of 6.27 % in the sixth week, of 3.96 % in the seventh week, of 8.01 % in the eigth week, of 7.70 % in the ninth week, of 6.96 % in the tenth week after weaning.

General conclusions and recommendations

Adult rabbits behavioral manifestations are significantly influenced by breed. According to the experiment no.1, the activity and rest in different positions behaviours were higher with the Californian breeds than the New Zealand white breeds, while abnormal behaviours were higher with the New Zealand white rabbits in comparison with Californian rabbits.
Also, rabbits behavioral manifestations are influenced by the animals sex but also by the natural climate conditions in the farming season. For example, activity behavioral manifestations were higher for New Zealand white rabbits during summer, rest in different positions behavioral manifestations were higher for these rabbits in comparison with the California ones , while abnormal behavioral manifestations were higher with the Californian rabbits in comparison with the New Zealand white rabbits.
Rabbits activity behavioral manifestations during winter were higher with the New Zealand white rabbits . rest behavioral manifestations in different positions behaviours were higher with the Californian rabbits than the New Zealand white rabbits, while abnormal behaviours were higher with the Californian rabbits in comparison with the New Zealand white rabbits.
Hour medium frequency of different behavioral manifestations constitutes a proper indicator of rabbits welfare achievement , namely a high level of activity and rest behaviours is adequate for a good achievement of welfare conditions , while the high frequency of abnormal behaviours show the existance of some problems in achieving their comfort. Consequently, observing abnormal behaviours may constitute a way of rabbits welfare achievement.
The behavioral manifestations of the young rabbits two breeds are significantly influenced by their age , especially starting with the fifth farming week from which on, there were recorded significant differences concerning behavioral manifestations.
Also, the differences rather high as value , although statistically insignificant show an obvious influence of the breed on their different behavioral manifestations.
In order to establish exactly different behavioral manifestations of the young rabbits but also of the adult rabbits in the two breeds , and the influence of different factors upon their behaviour , it is requested to do research continuously on their behaviour in order to achieve the optimum level of different welfare conditions for their farming.