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SEX DETERMINATION OF NEWBORN RABBITS WITH VISUAL AND HORMONE LEVEL MEASURING METHODS

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Introduction

In mammals sex determination of a newborn animal is generally simple. The outer morphological traits make the difference. In case of the domesticated rabbit however, recognizing the sex marks is far more difficult because the outer sex organs look very much alike right after birth. This topic is interesting for several reasons. The rabbit with its fast reproductive abilities is an important aid in biotechnological research. The early identification of sexes is of utmost importance in certain experiments. Besides,it is well-known that the does /especially angora does/ are unable to raise all of their offsprings, thus many breeders cull a significant proportion of the litter at 1-2 days after their birth.

The sex of the culled animals however, is important. For instance an angora doe produces up to 20% more and better quality wool than an angora buck. In meat production it would be more economical to raise male rabbits, because their feed conversion and growth rate is better than that of the female animals. Since in Hungary it is recommended even today /Holdas, 1985/ to separate the sexes at 5-6 weeks of age, therefore the aim of our investigation was to test the visual sex determination method suggested by Fox and Crary in 1972 and to check that method with autopsy and hormone analytical examinations.

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Material and Methods

We used the method described by Fox and Crary /1972/. Its essence is the following: the rabbit is held on your palm on its back, held by its rear legs, gentle pressure is applied on both sides of the urogenital papilla, and then the penis protrudes forming a circle, the vulva emerges from the papilla forming a slit. In case of a female animal, the anterior end of the vulva is higher, thus it slopes slightly towards the anus. In males there is no sloping or the upper level of the penis slopes slightly towards the umbilicus.
In our experiment we examined 40 one-day old rabbits with the above described method, then we bled them, driving their blood into tubes containing heparin. The blood samples were immediately centrifugatad, then their testosterone levels measured with RIA method. Finally we performed autopsy and determined the sexes based on the found morphological traits.

Results

We easily acquired the visual method of sex determination and since then we have been using it on a regular basis in our practice. During the experiment we failed to be correct in determining the sexes of 12,5% of the one-day old animals. Meanwhile with autopsy /fig.1./ or with measuring the plasma testosterone level it was possible to determine the sexes of the animals correctly. As it is shown in figure 2., the lowest level of testosterone in males /790 pmol/l/ was almost two times higher than in females /420 pmol/l/.
The awerage plasma testosterone concentration in males was 1049,7 pmol/l, and in females it was 244,4 pmol/l /fig.3./.

Discussion

The visual sex determination can be used with promising results in practice. The more we applied it the more correct our judgements became. Since it satisfies all practical needs its wide-spread use among Hungarian breeders would increase the profitability of their enterprise without additional costs due to the increased quantity and quality of their end-products.

In those cases when the urogenital papilla cannot be open at the first trial on the surrounding area an oedematic swelling may develop that decreases the chances of a correct diagnosis. In such cases and when there isn't enough light in the barn a device designed by us can be very helpful. It's a box closed on five sides, equipped with a 40 W light bulb and a three times magnifying glass /Gábor et al.,1987/. At autopsy in male animals the descensus of the testicles had begun, located around the urinary bladder, their colour was opalesque, the head of the epididymis was definitely separated. In females the ovaries were located well above the urinary bladder, and were elongated bean-shaped, with translucent colour. Thus it is possible with a 100% correctness to separate the sexes based on the inner sex organs in one-day old rabbits.

It is proved by several examinations /Arslan et al., 1981.; Baumans et al., 1985.; Nussdorfer et al., 1980./ that from the testicular androgens the testosterone is responsible for the embrional development of the male sex organs. There is a significant production of androgens /androstendion,testosterone/ within the foetal testicules. It is possible to increase the testosterone production of the foetal and neonatal testicles with HCG. Thus we supposed that it was possible to demonstrate the increased level of testosterone in male embryos on the first day of the postnatel period. This fact could serve with a reliable method of shecking the correctness of the early /visual/ sex determination. And it is very likely the case, because we have had experiments when we got almost the same results of testosterone level measured from one drop of whole blood /approximately 100 μl/ and from the plasma. Though these levels measured by us are slightly higher than given by literature /Berger et al.,1980./ but in tendency they are alike: There exists a significant difference between the opposite sexes at one day of age, thus it is possible to determine their sexes with a 100% accuracy.

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Fig.1.:Results of sex determination groupped according to methods

Method	Male	Female	Wrong
Visual diagnosis	18 /45%/	22 /55%/	5 /12.5%/
Hormon-analitical	15 /37.5%/	25 /62.5%/	- -
Autopsy diagnosis	15 /37.5%/	25 /62.5%/	- -

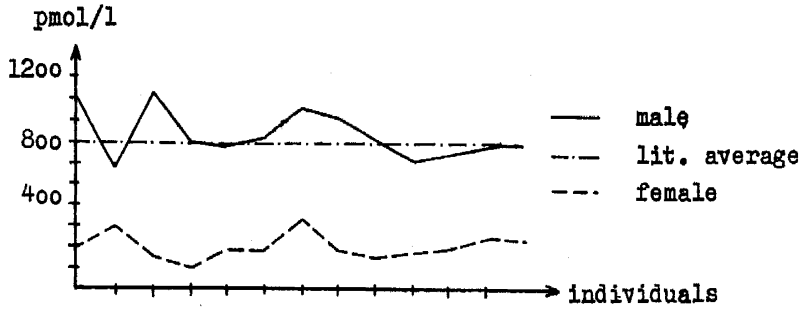

Fig.2.:Changes of plasma testosterone level in one-day old rabbits

Fig.3.: Average testosterone blood level of one-day old rabbits

Sex	Plasma testosterone conc.
Male /n=25/	1049.7±162.0
Female /n=15/	244.4±113.2

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We determined the sex of fourty, one day old rabbits then bled and dissected them. We measured the plasma testosterone level with RIA method. We established that the visual sex determination described by Fox and Crary /1972/ can be readily acquired and used with good results.
With dissectioning it is possible to determine the sex of the newborn rabbit with great certainty and this was our method to check with the results of the plasma testosterone tests. It became evident that it is possible to separate the sexes with a hundred per cent certainty, because even the lowest testosterone level measured in males /790 pmol/l/ proved to be almost twice as high as the peak value /420 pmol/l/ ever measured in female animals.
The average testosterone level of males was 1049,7 $\pm$ 162,0 pmol/l, and that of the females was 244,4 $\pm$ 113,2 pmol/l.
We obtained almost similar results upon measuring the hormone level of a single drop of whole blood.

DAS FESTLEGEN DER GESCHLECHTER VON EINTAGSKANINCHEN MIT VISUALEN UND HORMONANALYTISCHEN METHODEN

Gy. Gábor, L. Zöldág, Gy. Falkay

Während unserer Untersuchungen wurden nach visualer Methode bei 40 Eintagskaninchen das Geschlecht untersucht, man liess sie verbluten und hat sie aufgemacht. Aus dem Blut haben wir mit der RIA Methode die Plasmakonzentration des Testosteron festgelegt. Wir stellten fest, dass die durch Fox und Crary im Jahre 1972 niedergeschriebene Geschlechtsbestimmung leicht und schnell anzunehmen und mit guten Ergebnissen zu handhaben ist. Durch das Öffnen des Körpers kann man eindeutig das Geschlecht des kleinen Kaninchens feststellen, und mit dieser Hilfe überprüften wir die durch uns vorgenommene Blutplasma-Testosteron Untersuchungen. Es stellte sich heraus, dass mit Hilfe der Testosteron-Analyse auch mit hundertprozentiger Sicherheit die Geschlechter zu trennen sind, weil beim männlichen die niedrigste gemessene Testosteronstufe /790 pmol /l/ ungefähr das zweifache von dem im weiblichen gemessenen höchsten Wert /420 pmol/l/ war.
Die durchschnittliche Testosteronstufe bei den Rammlern war 1049,7$\pm$ 162,0 pmol/l/, die der Weibchen jedoch 244,4 $\pm$ 113,2 pmol/l/. Annähernd gleiche Ergebnisse waren auch in dem Fall als die Untersuchungen an einem Tropfen vollständigen Blutes vorgenommen wurden.