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EFFECT OF PREGNANCY AND LACTATION ON THE DIGESTIBILITY OF NUTRIENTS IN RABBITS

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Introduction

The economical character of rabbit production is markedly dependent on that how we can utilize the favourable reproduction biologigal facilities of the breed. From the point of view of nutrition for this we have to know the need of animals in different production phases as well as the efficiency of absorption. Though this latter was tested by many researchers /Lebas,1975;1979;Kalugin,198o;Martens and De Groote,1982;Partridge et al.,1986/, rather few concrete figures can be found in the publications, often even the tendency of the results is contradictory to each other.
In our experiment we tested the development of the apparent digestibility coefficients of the genarally used rabbit breed diet, respectively analysed the reasons of experienced alterations traceable back to the requirement of the nutritive matter, feed intake, milk production.

Methods and materials

Earlier already born empty, not sucking 2o New Zealand White breed, of 3775 g mean body mass does after artificial insemination carried out on the same day, were placed into individual metabolic cages. Animals were fed exclusively with rabbit breed diet /16.5 % crude protein, 11.2 % crude fibre, 11.5 MJ metalslizable energy/ ad libitum.
2.75 Mcal

Consumption of feed was recorded daily.
The pregnant does were made bring forth with oxitocin injection on the 29. day at the same time. Then we chose those, who brought 8 rabbits into the world. Seven such animals were found, the experiment was later continued only with them. In case of sucking age deaths come about in course of the lactation /35 days/ the litter number was continuously completed to 8. The does were rotationally changed among the litters by occasion of one daily sucking. All this was carried out in support of the animals' convenient degree, almost identical employment by this the better comparison. After sucking time the does stayed constantly in the metabolic cages. Milk production was measured daily on the basis of the difference of the does before and after sucking.
With respect to the period from mating to separation the digestibility coefficients were determined dissolved to 4 days periods. The utilization of the fed diet - as control - was examined with four not mated animal applying 2 x 4 days excreta collection.

Results

In course of pregnancy the mean daily feed intake was 129 g/day. Its formation however, was not steady. The mean value of 158 g measured in the first third of pregnancy practically was in agreement with the consumption of the control /not mated/ group. In the second third of pregnancy this quantity already dropped back to 142 g, in the third however, not more than 92 g /1.fig./ After dropping feed intake /1.fig./ raise quickly, reaches its maximum on the 14.day. Subsequently, merely slight decrease can be observed and even a the separation the values are higher by some 25 % than it was at the beginning of pregnancy. During the 35 day lactation we measured a mean milk production of 4.3 kg what reached its maximum on the 19.day. Comparing the curve of the milk production with the feed intake /2.fig./, it can be seen, that in the rising branch - shifted with some 5 days in time - they progress collaterally. After this however, they separate each other definitely, the milk production decreases

rapidly after the culmination to the separation. The value of the utilization coefficients /1.table/ is practically unchanged until the 2o. day of the pregnancy, remains on the same level of control. After this in turn, we experienced a significant decrease of all the coefficients. At the crude protein this decrease already appeared earlier, between the 17-2o. days. At dropping respectively on the day after, excrement voidance practically was not observed, therefore we could determine the utilization coefficients only after this. It can be seen that their value reaches again the level characteristic of the beginning of pregnancy already between the 3.-6. days, moreover, slight improvement was shown at the dry matter and the organic matters between the 15-22. days of lactation, then till the separation it remained substantially identical to the control. The utilization of the crude protein was formed differently from the other components. We already at the beginning of the lactation got significantly higher values, than at the control, respectively at any period of the pregnancy. Until the 22.day digestibility remained on the same level, after this however, it decreased till separation. In spite of this it was higher than what we measured at the control animals respectively in any period of pregnancy.

Discussion

Opinions concerning the feed intake of pregnant rabbits are already neither uniform. According to Partridge et al./1986/ the feed intake raises at once in the first week of pregnancy, then it decreases gradually till dropping. It is supposed that some kind of feed-back mechanism takes effect, at the animal regulating the intake of energy and the degree of fat deposition. At the same time on the basis of dates of Reyne et al. /1977/ the feed consumption without its increase continuously decrease ~~continuously decreases~~ till dropping. Our experiments justified this latter, what can be explained with that the proper mass gain of the offspring begins around the 2o. day of the pregnancy, what changes exponentially on short distance, and almost linearly from the 23.day /Prud'hon and Selme,1973/.

In consequence of this the first two thirds of pregnancy does not mean any burden to the doe. The subsistence ration is generally enough until the 2o. day of pregnancy, what is justified by the identical level of the does'voluntary feed intake with the feed intake of not pregnant animals. From the 21. day to dropping the mass of the single offsprings increases from o.1 % to 1.2 % of the doe's mass /Kamphues,1985/. In this period the doe's energy and nutritive matter requirement is higher as a consequence of the development of the offspring and the udder tissue. Simultaneously however due to the increase of the offspring the receiving ability of the digestive tract decreases, so lower and lower feed intake level will join to the increased nutritive matter requirement. The feed consumption of the does during the sucking period is primarily determined by their milk production, so feed intake delineates a curve similar to milk production. On the basis of the studies of Partridge et al. /1986/ the doe mobilizes its tissues at the time of the maximum milk production, since even in spite of the remarkably raised feed intake it is unable to cover the nutritive matter requirement of the milk production. It is probable that the feed intake remaining at high level after peak production serves the regeneration of the tissues. The fact, that the utilization coefficients on the 2o.day of the pregnancy are practically identical with that of the control group, the conclusion can be drawn, that this period for does - as it was already the matter in hand in connection with the feed intake - does not imply burden. The decrease of values taking place in the last third of pregnancy Lebas /1979/ explains with that the moist content of the excreta continuously increases with the approach of the drop, what enables the easier purging of the digestive tract. It is supposed that in addition to this still another process is instrumental in this. Since the mass increase of the offspring restricts the doe's ability of feed intake to higher and higher degree, at the end of pregnancy the development of the offspring and its fulcra as well as the udder tissue happens on the account of the doe's body tissue /Lebas,1975/. According to Kamphues /1985/ in the last period of the pregnancy the feed intake of

the doe enables the development of only four offsprings and the udder tissue, all additional offspring comes into being on the account of the doe's reserve. By way of this it is possible that in the faeces appear only undigested matters not only of feed origin, but increases the extent of endogenous voidance, by what in turn the feed is charged at the calculation. This however leads to the decrease of the utilization coefficients. According to our assumption therefore in this case the matter can be an apparent decrease and not that the utilization of the feed accepted otherwise in less and less quantity would spoil.
A significant part of the conception products is protein so the doe's requirement towards this specially raises. Accordingly, it begins probably earlier the mobilization of the protein, respectively it will be of greater extent than that of the other nutrients. In our estimation it can be explained by this that the decrease of digestibility of the protein appeared already between the 17-2o. days as well as that its extent was greater. After dropping the offspring does no more restrict the feed intake, the consumption of the animal raises immediately. Meanwhile the digestibility coefficients reach the value of the control. The intensity of the increase of feed intake exceeds that of milk production and soon will reach the maximum of the intake capacity. In this period probably only a part of the consumed feed will serve as cover of the more and more increasing milk production the rest is necessary to substitute the degraded body tissues during pregnancy.It is presumable that here substantially takes place a just reverse process than at descriptions connected with pregnancy, what appears in a slight improvement of the utilization coefficients of the dry matter and organic matters in our experiment. Because of the more increased requirement in the direction of the crude protein this tendency came probably better across, what in this case appeared as a significant improvement of the utilization. Approaching to the end of lactation the digestibility coefficient of the crude protein decreased. Martens and De Groote /1982/ explains this with the relatively high feed intake still existing at the end of lactation.

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Table 1. Apparent digestibility / % /

	day		dry matter	organic matter	crude protein	crude fiber	crude fat	N-free extract
CONTROL		$\bar{x}$	76,94^{cd}	77,36^{ac}	75,17^{abcde}	36,52^{a}	86,5o^{ab}	77,65^{ab}
		s	1,6o	1,44	1,9o	3,61	1,o6	1,64
PREGNANT DOES	1- 4	$\bar{x}$	76,64	77,17	74,78	36,6o	86,6o	77,oo
		s	1,8o	1,21	1,86	3,83	1,7o	1,72
	5- 8	$\bar{x}$	76,49	77,31	74,88	34,45	86,9o	76,51
		s	1,51	1,34	1,7o	4,o1	1,o8	1,83
	9-12	$\bar{x}$	76,29	77,11	73,55	35,26	85,64	76,43
		s	1,1o	1,71	2,o2	3,75	o,86	1,88
	13-16	$\bar{x}$	76,79	77,29	74,32	33,86	86,54	76,59
		s	1,31	1,63	1,66	3,68	1,21	1,72
	17-2o	$\bar{x}$	76,o3	76,67	72,48^{a}	36,o9	86,oo	76,17
		s	1,47	2,o1	1,78	3,46	1,o5	1,44
	21-24	$\bar{x}$	74,56^{c}	75,51^{a}	71,65^{c}	35 72	84,93^{a}	75,61^{a}
		s	1,15	1,68	2,1o	3,85	1,17	1,o8
	25-28	$\bar{x}$	73,43^{d}	74,51^{c}	71,o6^{d}	31,86^{a}	84,62^{b}	75,43^{b}
		s	1,51	1,5o	1,73	3,73	1,36	1,57
LACTATING DOES	3- 6	$\bar{x}$	76,11	77,5o	77,o7^{e}	35,o8	85,94	76,9o
		s	1,27	1,17	1,82	3,19	1,14	1,65
	7-1o	$\bar{x}$	76,64	78,o4	76,22	37,o3	86,1o	76,12
		s	1,34	1,12	1,96	3,oo	o,9o	1,84
	11-14	$\bar{x}$	76,12	77,24	75,89	34,46	86,59	76,54
		s	1,51	1,o6	1,74	3,12	1,o5	1,7o
	15-18	$\bar{x}$	77,24	78,57	77,o1	36,88	86,o8	77,oo
		s	1,48	2,o1	2,2o	4,o6	1,27	1,57
	19-22	$\bar{x}$	77,18	78,34	77,4o^{b}	35,36	87,13	77,17
		s	1,46	1,84	1,98	3,46	1,3o	1,84
	23-26	$\bar{x}$	77,o2	78,o4	76,9o	37,44	85,81	75,43
		s	1,57	1,6o	1,92	3,55	1,19	1,54
	27-3o	$\bar{x}$	76,72	77,23	76,o7	34,39	86,22	76,53
		s	1,o8	1,38	1,6o	3,33	1,o5	1,92
	31-34	$\bar{x}$	76,51	77,26	75,82	35,54	86,44	76,oo
		s	1,31	1,61	2,1o	3,57	1,16	1,86

Significant differences in the same column are signed by the same letters.

a,b,e : $P<o,o5$ c,d : $P<o,o1$

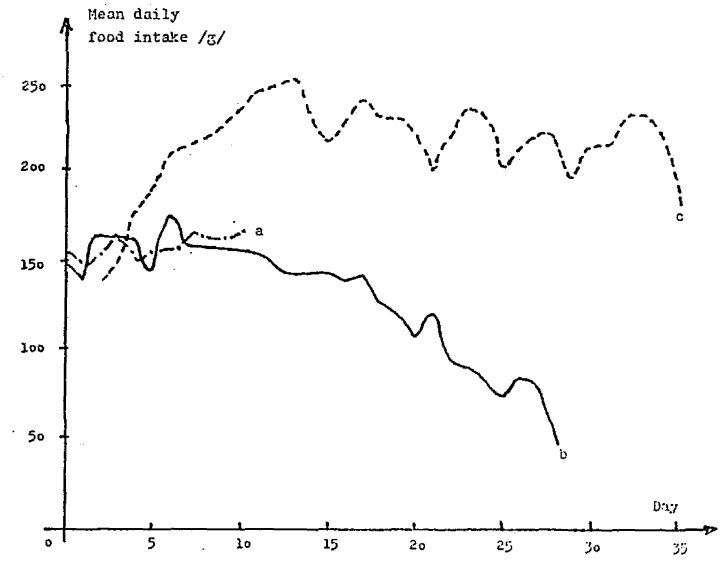

Fig. 1. The daily food intake of does
control /a/ ; pregnant does /b/ ; lactating does /c/

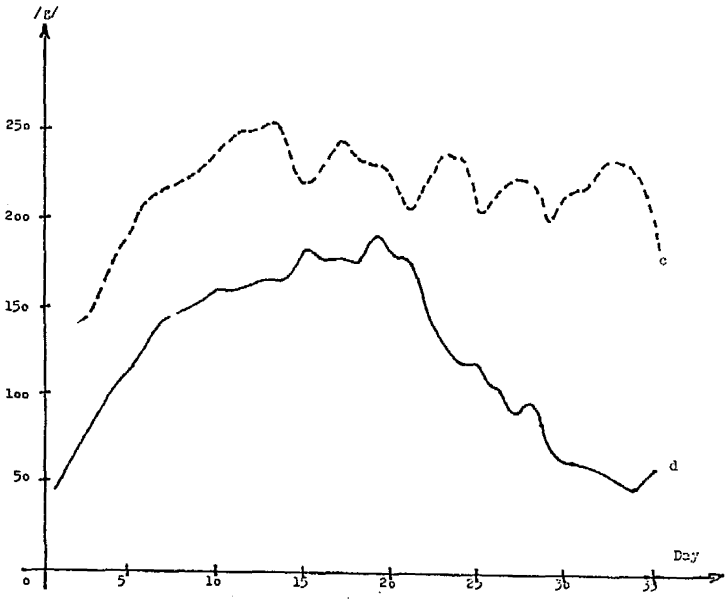

Fig. 2. The daily food intake /c/ and the amount of milk production /d/
of lactating does

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Authors placed once already littered,20 New Zealand White does into individual metabolic cages after artificial fertilization carried out on the same day. The pregnant does were made bear simultaneously with oxitocin injection on the 29. day. In the trial the does littering eight were left, in case of death the number of litter was brought up to eight. The does were changed rotationally among litters by occasion of the one suckling per day. With regard to the period from the fertilization to the separation the digestibility coefficients were determined dissolved into periods of 4 days.In the last third of the pregnancy a decrease of the utilization values - particularly that of crude protein - was experienced. In course of the milk production in the utilization coefficients of the dry matter and the organic matters slight, and in case of the crude protein significant improvement was established.

DIE WIRKUNG DER TRACHTIGKEIT UND DER LAKTATION AUF VERDAULICHKEIT VON NAHRSTOFFEN IN KANINCHEN

Die Verfasser haben 2o früher schon geworfene Mutterkaninchen der neuseeländischen weißen Rasse nach der gleichzeitigen künstlichen Besamlungen in individuelle Bilanzkäfige gesetzt. Die trächtigen Tieren wurden am 29-sten Tag mit den Spritzen von Oxytocin zur selben Zeit Jungen werfen gelassen. Im Vesuch wurden die 8 geworfenen Mütter gelassen und die Wurfnummer im Falle des Abfalls zu 8 ergänzt. Die Mütter wurden während des täglichen einmaligen Saugens unter den Würfen rotationsgemäß gewechselt. Die Verdauungsfoeffiziente wurden bezüglich der Perioden der Trächtigkeit bis zum Absetzen auf Perioden von 4 Tagen zerlegt bestimmt. Im letzten Drittel der Trächtigkeit wurde die verminderung der Ausnütsungswerte - besonders die des Rohproteins - erfahren. Im Laufe der Milchproduktion wurde in Verdauungskoeffizienten des Trockensubstanz und organischen Substanz eine geringfügige, im Falle des Roheiweißes eine signifikante Verbesserung bestimmt.