Degree of hematuria increased as the pressure was further elevated, but disappeared rapidly following restoration to control pressure. The effect of renal venous pressure elevation on urine flow rate was one of progressive oliguria after a critical pressure was reached, and eventually anuria at the higher pressures. This effect was also reversible.

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Nucleic Acid Content of Mammary Glands of Rats Lactating 41 and 61 Days.* (28141)

H. ALLEN TUCKER† AND RALPH P. REECE
Department of Dairy Science, New Jersey Agricultural Experiment Station, New Brunswick‡

Lactation has been extended beyond normal length in mice(1) and rats(2,3,4) by replacing original litters with foster litters. In rats, either all litters gained at about the same rate(2,3) or litter weight gains declined one-third after the first 20 days and thereafter remained constant(4). Histological study of the mammary gland indicated that the lobule-alveolar system had not involuted (4).

The present investigation was undertaken to determine quantitatively the effects of extended lactation, by litter replacement, on mammary deoxyribonucleic acid (DNA) and ribonucleic acid (RNA) content and RNA/DNA ratio.

Methods. Lactation was extended in 11 rats to 41 days and in 12 rats to 61 days by providing eight 1- to 4-day-old foster pups every 21 days. Litter weight gain from the 7th to the 15th day after parturition or after litter replacement provided information on lactational performance. Body weights of mothers were recorded on 3rd day of lactation and at end of the extended lactation. Nucleic acid content was determined, as previously described(5), on 6 abdominal-inguinal mammary glands at the end of the extended lactation period.

Results. Total mg of DNA per 100 g of initial body weight (day 3 of lactation) were 10.56 and 10.94, and total mg of DNA were 23.25 and 24.33 for rats lactating 41 and 61 days, respectively. These estimates of mammary development did not differ significantly ($P>0.05$) from that of rats lactating 21 days (6). DNA per 100 g of final body weight was 9.58 and 9.48 for rats lactating 41 and 61 days, respectively. These values were significantly less ($P<0.05$) than those of rats lactating 21 days, but they merely reflect the increase in body weight which occurred during the extended periods of lactation.

Mammary glands of rats lactating 41 and 61 days contained 49.76 and 44.83 mg of

* Paper of the Journal Series, N. J. Agri. Exp. Station, Rutgers, The State University, New Brunswick.

† Present address: Dept. of Dairy, Michigan State Univ., East Lansing.

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TABLE I. Nucleic Acid Content of Mammary Glands of Rats Lactating 21, 41 and 61 Days.

	Days of lactation		
	21*	41	61
No. animals	12	11	12
Initial body wt (g)	—	221	223
Final " " "	231	242	256
DEEET† (mg)	1162.6	912.0	893.1
Total DNA/100 g initial body wt (mg)‡	—	10.56 ± .50§	10.94 ± .39§
Total DNA/100 g final body wt (mg)‡	11.03 ± .30	9.58 ± .39‖	9.48 ± .29‖
Total DNA (mg)‡	25.47 ± .64	23.25 ± 1.11§	24.33 ± .87§
" RNA (mg)‡	75.06 ± 2.69	49.76 ± 3.27¶	44.83 ± 3.03¶
RNA/DNA‡	2.95 ± .08	2.13 ± .09¶**	1.83 ± .09¶**

* Data from Tucker and Reece(6).
† Dried, ethanol-ether extracted tissue.
‡ Mean and standard error of mean.
§ Not significantly different ($P>0.05$) from 21st day of lactation.
‖ Significantly less ($P<0.05$) than 21st day of lactation.
¶ Highly significantly less ($P<0.01$) than 21st day of lactation.
** Glands of 41-day lactating rats significantly greater ($P<0.05$) than glands of 61-day lactating rats.

total RNA, and the RNA/DNA ratios were 2.13 and 1.83, respectively. All these values were highly significantly less ($P<0.01$) than those of mammary glands of rats lactating 21 days. The RNA/DNA ratio in mammary glands of rats lactating 61 days was significantly less ($P<0.05$) than that of rats lactating 41 days (Table I).

Litter weight gains were 82.4 and 47.5 g for the first and second consecutive lactations, respectively, of the group lactating 41 days and 87.1, 34.6, and 37.5 g for the first, second, and third consecutive lactations, respectively, of the group lactating 61 days. Lactational performance, compared with that during the first 21 days of lactation, declined an average of 51.6% and 55.7% in 41- and 61-day lactations, respectively (Table II). This decline in lactational performance was greater than that observed in RNA/DNA ratio.

Discussion. Foster litter weight gains, compared with original litter weight gains, were less than those previously reported. These divergent results might be due to differences in frequency of replacing foster litters, in number of pups per mother, and in size or age of pups when first replaced.

Since the number of mammary cells was not reduced, as judged from DNA content of 6 abdominal-inguinal mammary glands, the reason for foster litters to gain less rapidly than original litters may be because of reduced secretory activity. This idea is supported by the finding that total RNA and RNA/DNA ratios were greatly reduced in glands from rats lactating 41 or 61 days when compared with glands from rats lactating 21 days.

It is suggested that nucleic acid determinations of mammary glands of rats lactating for extended periods would be useful in endocrine replacement studies of gland growth and galactopoiesis.

TABLE II. Litter Weight Gains from 7th to 15th Day After Parturition and After Litter Replacement.

Days of lactation	Litter wt gain (g)*		
	1st†	2nd†	3rd†
41	82.4 ± 3.44	47.5 ± 4.56	—
61	87.1 ± 2.23	34.6 ± 3.45	37.5 ± 3.99
Avg	84.7 ± .20	41.0 ± .31	37.5 ± 3.99

* Mean and standard error of mean.
† 8 pups per litter.

Summary. DNA content of mammary glands of rats lactating 41 or 61 days was not significantly different from that of glands of rats lactating 21 days (10.56 mg and 10.94 mg *vs* 11.03 mg). RNA content of mammary glands of rats lactating 41 or 61 days was highly significantly less than that of glands of rats lactating 21 days (49.76 mg and 44.83 mg *vs* 75.06 mg). Similarly, body weight gains of foster litters were less than those of original litters.

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Temporal Variations in the Collagen, Noncollagen Protein and Hexosamine of the Uterus and Vagina.* (28142)

CHARLES F. MORGAN
Department of Anatomy, University of Minnesota Medical School, Minneapolis

The rat uterus following parturition and undergoing involution showed a rapid loss of collagen (C)(1,2). Harkness, Harkness and Moralee(3), however, have reported that growth and removal of C in the rat uterus during the estrous cycle were small and not significant. The investigation of Morgan(4) indicated that low levels of estrogens administered to castrate rats induced a greater quantity of hexosamine (Hx) and hydroxyproline (OHP) in the uterus and vagina. The present study was designed to reexamine the uterus and vagina of the rat during the estrous cycle for possible changes in C and Hx content. C can be approximated by determining OHP since the latter occurs in significant amounts only in C(5). Hx is characteristic of the mucopolysaccharides (MPS) but is also present in mucoproteins, mucoids and glycoproteins(6). Total nitrogen (N) content and percent moisture (M) were also determined.

Materials and methods. Five groups of 6 rats of the Holtzman strain weighing from 172 to 236 g at time of autopsy were used. The stages of the estrous cycle considered were: diestrus, proestrus, estrus and postestrus. One group of rats was studied for each stage. Vaginal smears were examined for 3 weeks to make certain that autopsy would coincide with the height of each particular stage. A control group of 6 animals, castrated 4 weeks prior to time of autopsy, was included. The dry weights of the tissues were obtained on a microbalance after the tissues were lyophilized for 30 hours with a VirTis freeze-dryer. Chemical procedures employed to determine OHP, Hx and N were: 1) OHP by the method of Neuman and Logan(5); 2) Hx by the Boas method(7); 3) total N by the micro-Kjeldahl method of Koch and McMeekin(8). OHP, Hx and N values were based on the mean dry weight for each group calculated in 2 ways: 1) concentration (μM/g) and 2) amount (μM) in the entire uterus or vagina. These data were further studied by making calculations in mg of: 1) C by multiplying the weight of OHP $\times$ 7.46(9); 2) N in C by multiplying C $\times$ 0.186(10); 3) N in Hx by multiplying the weight of Hx by 0.079; 4) noncollagen protein (NCP) by multiplying the weight of total N $\times$ 6.25 after correcting for the N in C and Hx. The square roots of the weights of C and NCP were determined to obtain a more equal response variable among the observed values. All data were tested for significance by the use of Student's "t" test. The mean and standard error of the mean were calculated for all groups of the data.

Results. Uterus. Cyclical changes in OHP in the intact animal (Fig. 1 and 2) were as follows: 1) concentration of OHP was lowest at estrus (195 μM/g $\pm$ 5.85). This was less than at proestrus (251 μM/g $\pm$ 19.16, $P<.05$) and at diestrus (247 μM/g $\pm$ 10.80, $P<.01$); 2) amount of OHP reached its peak during postestrus (28.2 μM $\pm$ 4.50), was slightly less at estrus (26.2 μM $\pm$ 2.16) and was lowest in diestrus (14.4 μM $\pm$ .70); 3) amounts for both postestrus and estrus were

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