yeast exert any effect pertaining to hemoglobin formation other than protection of the birds from the hemorrhaging which occurs in exudative diathesis.

Total serum protein levels were elevated by addition of Vit. E, selenium, as the selenate at all 3 of the levels tested, as the selenite, and by 10% dried brewers yeast (Table IV). No increase was noted after the feeding of dried brewers yeast ash or selenium as the free metal. A/G ratios, as determined by electrophoresis, were again increased with Vit. E, the 3 levels of selenate added to the diet, the selenite and 10% dried brewers yeast. Only a slight improvement with regard to A/G ratio was noted upon feeding 10% dried brewers yeast ash, as was also true with the addition of 0.5 ppm selenium. Selenium, as selenate, at a level of 1 ppm was apparently not as effective and perhaps was detrimental as compared to the level of 0.1 ppm. The A/G ratio obtained with 1 ppm selenium from selenate was 0.30. The A/G ratio obtained with 0.1 ppm was 0.42 which was identical to that obtained with 20 mg *d*-alpha tocopheryl acetate per lb of feed. The feeding of 10% dried brewers yeast resulted in an A/G ratio of 0.58 which was the highest obtained in this study.

The results of these studies show that addition of selenium to the Torula yeast basal diet will result in protection of the birds against symptoms of exudative diathesis, as reported by Scott(1). Free selenium appears to be only partially effective in overcoming the symptoms. The addition of a smaller quantity of selenium as selenate (0.1 ppm) will produce changes, with regard to red blood cell counts, hemoglobin, total serum protein, and A/G ratios, identical to those obtained by the feeding of 20 mg of *d-alpha* tocopheryl acetate per lb of Torula yeast basal diet. These data indicate that 1 ppm of selenium as selenate was toxic and therefore, even though protection was obtained from the gross symptoms of exudative diathesis, the blood components studied were adversely affected as a result of the toxicity of the selenium rather than by a Vit. E deficiency.

Summary. Two experiments have been conducted with White Rock and New Hampshire chicks concerning effects of selenium, Vit. E and dried brewers yeast on occurrence of exudative diathesis, and of these substances on blood changes associated with Vit. E deficiency. Selenium (selenate) at 0.1 ppm was effective in reversing the lowered red blood cell counts, lowered hemoglobin values, lowered serum protein levels, and the reduced A/G ratios associated with exudative diathesis. As this level was increased to 1 ppm the total blood changes were not as greatly affected as with feeding of 0.1 ppm level, apparently due to the toxicity of selenium.

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Blood and Urine Tyrosine Levels in Starved X-irradiated Rats. (23816)

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Davy(1) reported that dogs exposed to a 500 r dose of x-rays showed immediate fall in serum albumin with return to normal after 48 hours. Muntz, Barron and Prosser(2) indicated that a lethal total body dose of x-rays produced, in dogs, no characteristic changes in plasma protein pattern after one week following radiation. Thereafter, until death of the animal the serum proteins diminished steadily. Similar decreases in serum proteins

TABLE I. Serum Tyrosine Levels in 800 r Total Body X-Irradiated Starved Rats.

Time following radiation exposure (hr)			No. of rats	Mean serum tyrosine level, μg tyrosine equivalent / ml of serum	P level
24	starved	irrad.	7	54.4 ± 8.8	.019
	"	control	10	44.8 ± 4.9	
48	"	irrad.	9	61.2 ± 9.6	.007
	"	control	7	77.6 ± 9.6	
72	"	irrad.	10	45.1 ± 8.2	>.050
	"	control	8	53.2 ±11.2	
96	"	irrad.	5	35.0 ± 3.7	"
	"	control	10	35.4 ± 7.2	
Normal		control	15	52.4 ± 8.8	

were also reported by Goldwater and Entenman(3). Other work indicates variations in the amino acid excretion patterns in animals treated with ionizing radiations. Hallesy and Doull(4.5). Mefferd and Martens(6). These variations in blood and urine amino acid levels reflect protein changes resulting from radiation exposure. Herriott(7) found that as protein hydrolysis progressed the intensity of the blue color increased when the Folin-Ciocalteau phenol reagent was reacted with the supernatant from an active protein-enzyme system. In this report Herriott's method is used exclusively in following the protein changes, in terms of tyrosine, in the blood and urine of starved control rats and of starved x-irradiated rats.

Materials and methods. Adult male Sprague-Dawley rats weighing between 200 and 250 g were housed in a temperature controlled room maintained at about 75°F. Water was provided *ad libitum*, but food was withheld during the post-irradiation period. X-irradiation was administered as a single total body dose of 800 r from a General Electric Maxitron Unit operated at 250 kv and 30 ma. Added filtration consisted of 1 mm Al plus 0.5 Cu, HVL 1.1 mm Cu, with the tube to target distance measuring 50 cm. The dose rate was 122 r min as measured in air with a Victoreen 250 r Ionization Chamber. Blood was obtained by cardiac puncture under nembutal anesthesia, allowed to clot and aliquots of separated serum were subjected to quantitative analysis for tyrosine(7). Urine was collected daily, the 24 hours total output noted and aliquots were analyzed for tyrosine content.

Results. Table I shows mean serum tyrosine levels in starved rats at various intervals following 800 r total body x-irradiation. Results are for samples collected at 24, 48, 72 and 96 hours post-irradiation for starved irradiated rats and for starved control rats. In all cases, serum tyrosine level was expressed as μg tyrosine equivalent/ml of serum. At 24 hours post-irradiation, the serum tyrosine level was greater for starved control rats than for starved irradiated rats. At 48 hours the level in starved irradiated rats increased; whereas, an appreciable increase was noted for starved control rats. For 72 and 96 hours post-irradiation a continued decrease in the level occurred for both groups, dropping below the level of normal control rats. Starved irradiated and starved control serum levels were significantly different only for the 24 and 48 hour intervals.

The mean urine tyrosine levels in starved irradiated rats at various intervals following 800 r total body x-irradiation are shown in Table II. The level for starved irradiated rats was higher at all time intervals post-irradiation than for starved control rats. The difference between mean levels for these groups was statistically significant at all time intervals following irradiation exposure.

The data indicate that alterations occur in protein metabolism when food intake is restricted. It appears that protein catabolism

TABLE II. Urine Tyrosine Levels in 800 r Total Body X-Irradiated Starved Rats.

Time following radiation exposure (hr)			No. of samples	Mean urine tyrosine level, μg tyrosine equivalent / day • g body wt	P level
24	starved	irrad.	25	32.9 ± 3.4	<.001
	"	control	30	23.1 ± 4.4	
48	"	irrad.	30	19.1 ± 5.4	.024
	"	control	20	15.9 ± 4.2	
72	"	irrad.	20	16.7 ± 5.5	<.001
	"	control	20	11.4 ± 2.1	
96	"	irrad.	6	15.4 ± 4.8	.004
	"	control	10	9.4 ± 2.8	
Normal		control	18	61.5 ±10.0	

is somewhat slower following irradiation at the level used in this study.

Summary. Alterations in serum and urine tyrosine levels were observed in starved irradiated rats and in starved control rats. It appears that protein catabolism is somewhat slower following irradiation at the 800 r level we used.

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Influence of Oxidation Products of Epinephrine upon Adenosinetriphosphatase Activity of Uterine Muscle Preparation.* (23817)

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The physiological response of uterine muscle to epinephrine has been extensively studied, but biochemical aspects of the epinephrine effect have not been elucidated. The typical response of the non-pregnant uterus to epinephrine in most species is diphasic with an initial contractile response followed by a longer period of inhibition(1,2). The diphasic response is not typical during pregnancy(1). An attempt has been made to gain information concerning the biochemical changes accompanying hormonal stimulation of uterine contractility. It was found that the dephosphorylation of adenosinetriphosphate (ATP) by a contractile protein preparation from bovine uterine muscle was inhibited by oxidation products of epinephrine. Although the enzymatic activity is referred to here as adenosinetriphosphatase (ATPase) activity, it is probable that more than one enzyme is involved.

Materials and methods. The procedure commonly used for preparation of structural elements from skeletal muscle(3,4) was modified for isolation of the contractile elements of uterine muscle. Uterine tissue was obtained from 4 non-pregnant cows which, from examination of ovaries and luminal fluids, were apparently not in estrus at time of slaughter. The endometrium was carefully separated and discarded. The myometrium from the 4 animals was pooled and then chopped in a chilled meat grinder. The extraction and purification were carried out at 5°C. Glass-distilled water was used. One hundred and five grams of tissue were extracted with 350 ml of a solution 0.3 *M* in KCl, 0.15 *M* in K_2HPO_4 and 0.15 *M* in KH_2PO_4 by constant agitation with an electric stirrer for 5½ hours. The mixture was diluted with 1.4 liters of water and filtered through cheese cloth. The filtrate was diluted with water to 4.2 liters. Precipitation of protein was complete in about 3 days. Most of the supernatant was siphoned off and the rest removed by centrifugation. The precipitate was dissolved in 2 *M* KCl. The solution was then diluted to KCl concentration of 0.44 *M* and centrifuged to remove any precipitated material. The supernatant was filtered through glass wool, and diluted with water to KCl concentration of 0.22 *M*, which resulted in precipitation of the desired material. Pre-

* This work was initiated while the senior author was a graduate student in Department of Dairy Science at University of Illinois and has been continued under the auspices of the U. S. Atomic Energy Commission.