Effect of Fasting on Adipose Tissue Weight in Chicks, with Reference to Changes in Chemical Composition and Lipase Activity

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Abstract The effect of fasting on adipose tissue weight was investigated in growing chicks. Fasting considerably decreased the wet weight of adipose tissue by decreasing the dry matter content per deoxyribonucleic acid. The decrease in dry matter content was mainly associated with the decrease in triglycerides, a major component in the adipose tissue. Both the activities of lipoprotein lipase (LPL) and hormone-sensitive lipase (HSL) were reduced markedly by fasting. An approximate 60% decrease in the plasma triglyceride concentration was induced by fasting. Fasting markedly decreased the incorporation of ^{14}C -acetate into fatty acids and of ^{14}C -palmitate into triglycerides in the liver *in vivo* and *in vitro*, whereas the $^{14}\text{CO}_2$ expiration from [$1\text{-}^{14}\text{C}$] palmitate *in vivo* and *in vitro* was increased by fasting. The mechanisms of triglyceride diminution in the adipose tissue of chicks by fasting is discussed.

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Key words : fasting, chick, adipose tissue accumulation, liver, triglyceride metabolism

It is generally accepted that fasting induces a marked decrease in body fat content in both avian species and mammals^{3,8,17,33}. In mammals, there have been a number of studies on the influences of fasting on body fat deposition^{6,7,11,15,20,26-31,35}. PAIK and YEARICK²⁸ have proposed that one mechanism, other than *de novo* lipogenesis, in fat deposition is a change in the relative activities of LPL, which mediates the uptake of fatty acid from plasma triglyceride, and HSL, which mediates the output of fatty acid from adipose tissue triglyceride, in adipose tissue. On the contrary, in avian species, little information is available as to the mechanisms by which fasting reduces body fat, because the studies on hepatic lipid metabolism have been of particular interest by reason that lipid synthesis in chicks is mostly

restricted to the liver. Since avian adipose tissue, differing from mammalian adipose tissue, has a very low lipogenic activity^{21,25,37}, fat deposition in this tissue seems to be regulated mainly by the above two lipase systems. Although the influences of fasting on triglyceride metabolism in the liver have been well studied^{10,22,32,36,37}, there is only limited information on the interrelationship between triglyceride synthesis and fatty acid oxidation in the liver of chicks treated by fasting.

This investigation was carried out to determine the changes made by fasting in the chemical composition, lipid composition and two lipase (LPL and HSL) activities in the adipose tissue of growing chicks. In addition, we investigated these changes by fasting via triglyceride synthesis and fatty acid oxidation in

the liver.

Materials and Methods

Animals and design: Male Single-Comb White Leghorn chicks were used and fed a commercial chick starter ration from one day old to 21 days of age. Three experiments were carried out. In experiment 1, 21 day-old chicks were allocated into 4 groups of 4 chicks each. One group was fed *ad libitum* a commercial chick starter ration for 3 days. The other three groups were deprived of food for 1, 2 and 3 days, respectively. At 24 days of age, the chicks were provided for lipase assay and chemical analysis. In experiment 2, 21 day-old chicks were allocated into 2 groups of 4 chicks each. One group was fed *ad libitum* a commercial chick starter ration for 2 days. The other group was deprived of food for 2 days. At 23 days of age, the chicks were provided for chemical analysis and lipase assay. In experiment 3, 21 day-old chicks were allocated into 2 groups of 4 chicks each. One group was fed *ad libitum* a commercial chick starter ration for 2 days. The other group was deprived of food for 2 days. At 23 days of age, the chicks were provided for determinations of triglyceride synthesis and fatty acid oxidation. Water was provided freely at all times. Room temperature was maintained at $24 \pm 2^\circ\text{C}$.

Lipase assay and analytical procedure: At the end of the experiment, the chicks were decapitated and the abdominal adipose tissue was immediately excised together with the peritoneum. The tissue sample was weighed, minced with scissors and taken for lipase (LPL and HSL) assay and chemical analysis. Blood was collected into a heparinized tube and centrifuged at $2,000 \times g$ for 10 minutes within 30 minutes after the collection. The plasma sample was stored at 4°C pending analysis.

LPL activity was assayed as described previously¹²⁾. The minced sample was homogenized in 100 volumes of ice-cold acetone, using a Waring blender. This suspension was

filtered through No. 2 filter paper (Toyo Roshi Co.) on a Buchner funnel and washed successively with 100 ml of acetone and 100 ml of diethylether at room temperature. The residue on the filter was dried for 1 hour *in vacuo* at 4°C . Ten mg of dried material was scraped from the filter paper into 15 ml of ice-cold 0.025 M NH_4OH and extracted at 0°C for 1 hour with stirring. The extract was centrifuged at $15,000 \times g$ at 0°C for 30 minutes. The clear supernatant was used for activity assay. The LPL activity was determined by measuring the amount of free fatty acid released by hydrolysis of an artificial triglyceride emulsion (ediol, Calbiochem. Co.) activated by preincubation with starved fowl serum. HSL activity was assayed as described previously¹²⁾. The minced sample was homogenized in 6 volumes of 0.25M sucrose (pH 6.8) containing 1mM EDTA, using a Waring blender. The homogenate was centrifuged at $12,000 \times g$ at 0°C for 30 minutes. The fat cake of the upper phase was carefully removed and the supernatant fluid of the medium phase was used for activity assay. The HSL activity was determined by measuring the amount of free fatty acid released via the hydrolysis of ediol. The activities of both LPL and HSL were expressed as μmol fatty acid released per hour per mg DNA.

Minced samples were taken for determining of DNA, moisture, lipid and protein content. DNA content was determined via the method described by BURTON⁹⁾. Moisture content was determined by drying the sample at 135°C for 2 hours. Protein content was estimated from nitrogen content which was determined by a micro-Kjeldahl method. Lipid was extracted with a chloroform-methanol mixture (2 : 1, v/v), washed with 0.04% MgCl_2 solution to remove nonlipid substances via the method of FOLCHET *et al.*⁹⁾ and then determined gravimetrically. Suitable portions of total lipid were taken for determining the triglyceride, phospholipid, total cholesterol and free fatty acid content. The plasma total lipid was ex-

tracted from the plasma sample and determined by the method of BRAGDON⁴). Suitable portions of the total lipid were taken for determination of each lipid component.

Triglyceride synthesis and fatty acid oxidation determinations: *In vivo* triglyceride synthesis and fatty acid oxidation were determined by the procedure described in a previous paper¹⁴). At the end of the experiment, each chick was intravenously administered with 0.2 ml of either saline containing 4 μ Ci sodium [1-¹⁴C] acetate (53 mCi/mmol, Amersham, Buckinghamshire, UK.) or a suspension containing 4 μ Ci palmitate-bovine serum albumin complex prepared using [1-¹⁴C] palmitate (50 mCi/mmol, Amersham, Buckinghamshire, UK)¹³). Immediately after the administration, each chick was placed in a plastic box equipped with two glass tubes, CO₂-free air was passed through one tube at a constant rate and through the other tube expired CO₂ was trapped in a mixture of ethanolamine and methylcellosolve (1 : 2, V/V) for 10 minutes. Ten minutes after the administration of the isotope, the chick was killed by decapitation and the liver was rapidly removed, weighed and used for the determination of synthetic rates. The rates of *in vivo* fatty acid synthesis from acetate and triglyceride synthesis from palmitate were expressed as dpm per mg of DNA. The rate of *in vivo* palmitate oxidation to CO₂ was expressed as dpm per 100 g of body weight per 10 minutes.

In vitro triglyceride synthesis and fatty acid oxidation were determined by the procedure described in a previous paper¹⁴). At the end of the experiment, chicks were killed by decapitation, and the livers were rapidly removed, weighed and chilled. Liver slices weighing 100 to 150 mg were prepared in the cold with a Stadie-Riggs handmicrotome, rinsed in an ice-cold NaCl solution (0.9%) and used for the determination of synthesis. The rates of *in vitro* fatty acid synthesis from acetate, triglyceride synthesis from palmitate and palmitate oxida-

tion to CO₂ were expressed as nmoles of substrates converted to products per mg of DNA per 2 hours.

Statistical treatment: The statistical significance of the difference between means was analyzed using the Student's t-test.

Results

Experiment 1: The change in the abdominal adipose tissue weight during 3 days of fasting is shown in Table 1 A. On the 1st day of fasting, the tissue weight began to decrease and attained 26% of the weight of the fed group on the 2nd day. There was no significant difference in the tissue weight between a 2-day and a 3-day fasting. In the following experiments, therefore, the abdominal adipose tissue from chicks subjected to 2 days of fasting was used. As shown in Table 1 A., the plasma free fatty acid concentration increased markedly on the 1st day, but decreased gradually from the 2nd day. By the 3rd day of fasting, it returned to pre-fasting level. The LPL/HSL activity ratio showed no change during 3 days of fasting (Table 1 B).

Experiment 2: The changes in body weight, adipose tissue weight and adipose tissue DNA content by fasting are shown in Table 2 A. The weight of body and adipose tissue decreased 20% and 60% by fasting, respectively, although adipose tissue DNA content was not affected. The changes in chemical composition of the adipose tissue by fasting are shown in Table 2 B. The dry matter content per mg DNA decreased 59% by fasting. Although the moisture content per mg DNA showed a 37% decrease, the percentage of this component to the wet weight was only 20% or less. The lipid content per mg DNA showed a 59% decrease by fasting. Although the protein content showed a 68% decrease, the percentage of this component to dry matter was only about 10%. The change in lipid composition of the adipose tissue by fasting is shown in Table 3. The triglyceride content per DNA,

Table 1. Effect of fasting on body weight, abdominal adipose tissue weight, plasma FFA concentration (A), and the activities of lipoprotein lipase (LPL) and hormone-sensitive lipase (HSL) in the abdominal adipose tissue (B) (Experiment 1)

(A)

Treatment	Body weight (g)	Adipose tissue weight		Plasma FFA (μ Eq/100 ml)
		(g)	(g/100 g BW)	
Fed	247 $\pm$ 5	2.62 $\pm$ 0.22	1.06 $\pm$ 0.03	36.10 $\pm$ 4.87
Fasted, 1 day	217 $\pm$ 3**	1.14 $\pm$ 0.31**	0.53 $\pm$ 0.01**	65.73 $\pm$ 1.57**
Fasted, 2 days	196 $\pm$ 2**	0.67 $\pm$ 0.12**	0.34 $\pm$ 0.04**	53.41 $\pm$ 2.00*
Fasted, 3 days	183 $\pm$ 4**	0.61 $\pm$ 0.06**	0.33 $\pm$ 0.03**	40.09 $\pm$ 4.72

(B)

Treatment	LPL	HSL	LPL/HSL activity ratio
	(μEq/whole tissue/hr)		
Fed	237.8±16.5	17.81±0.72	13.35±1.14
Fasted, 1 day	88.5± 8.9**	8.22±1.14**	10.77±0.48
Fasted, 2 days	35.5±18.5**	3.41±0.63**	10.41±0.79
Fasted, 3 days	27.0± 3.3**	2.33±0.32**	11.59±1.81

Values are means $\pm$ S.E.M. of four chicks. *: Significant with respect to fed chicks. (0.05>P>0.01). **: Significant with respect to fed chicks. (P<0.01).

Table 2. Effect of fasting on body weight, abdominal adipose tissue weight, abdominal adipose tissue DNA content (A) and chemical composition of the abdominal adipose tissue (B) (Experiment 2)

(A)

Treatment	Body weight (g)	Adipose tissue weight (g)	Adipose tissue DNA (mg)
Fed	241 $\pm$ 5	2.76 $\pm$ 0.02	1.091 $\pm$ 0.068
Fasted	192 $\pm$ 1**	1.11 $\pm$ 0.12**	1.005 $\pm$ 0.118

(B)

Treatment	Moisture	Dry matter	Lipid	Protein	Residue
	(mg/DNA)		(mg/DNA)		
Fed	353 $\pm$ 52	2177 $\pm$ 185	1894 $\pm$ 213	252 $\pm$ 24	31 $\pm$ 4
Fasted	222 $\pm$ 15	882 $\pm$ 111**	779 $\pm$ 134**	80 $\pm$ 11**	23 $\pm$ 4
Treatment	(% of wet weight)		(% of dry matter)		
Fed	14.0 $\pm$ 1.7	86.0 $\pm$ 1.6	87.0 $\pm$ 2.1	11.6 $\pm$ 1.1	1.4 $\pm$ 0.1
Fasted	19.9 $\pm$ 0.8*	80.1 $\pm$ 0.8*	88.4 $\pm$ 2.9	8.9 $\pm$ 0.8	2.5 $\pm$ 0.1**

Values are means $\pm$ S.E.M. of four chicks. *: Significant with respect to fed chicks. (0.05>P>0.01). **: Significant with respect to fed chicks. (P<0.01).

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whose component percentage to the total lipid was about 98%, decreased 60% by fasting. Although phospholipid and total cholesterol content also decreased, these components accounted for less than 2% of the total lipid. The free fatty acid content per DNA, whose component percentage to the total lipid was 1% or less, showed a 1.8-fold increase by fasting. The changes in the activities of LPL and HSL in the adipose tissue by fasting are shown in Table 4. There was an 82% reduction in

LPL activity and a 79% reduction in HSL activity by fasting. The LPL/HSL activity ratio showed no change by fasting. The change in plasma lipid composition by fasting is shown in Table 5. The triglyceride concentration showed a 61% decrease by fasting, and its percentage to the total lipid decreased from 27.8 to 15.3. The phospholipid concentration also showed a 27% decrease, but the percentage of this component to the total lipid showed no change. The free fatty acid concentration was

Table 3. Effect of fasting on the lipid composition of the abdominal adipose tissue (Experiment 2)

Treatment	Triglyceride	Phospholipid	Total cholesterol	Free fatty acid
		(mg/mg DNA)		
Fed	1866±248	10±3	14±3	4±3
Fasted	760± 42**	4±4	8±4	7±3
		(% of total lipid)		
Fed	98.5±0.8	0.5±0.1	0.7±0.1	0.3±0.1
Fasted	97.6±0.7	0.5±0.1	1.0±0.1	0.9±0.1**

Values are means±S.E.M. of four chicks. **: Significant with respect to fed chicks. (P<0.01).

Table 4. Effect of fasting on the activities of lipoprotein lipase (LPL) and hormone-sensitive lipase (HSL) in the abdominal adipose tissue (Experiment 2)

Treatment	LPL	HSL	LPL/HSL activity ratio
	(μ Eq/mg DNA/hr)		
Fed	218.0±15.1	16.3±2.1	13.9±1.7
Fasted	38.9± 3.8**	3.5±0.5**	11.3±0.5

Values are means±S.E.M. of four chicks. **: Significant with respect to fed chicks. (P<0.01).

Table 5. Effect on fasting on plasma lipid composition (Experiment 2)

Treatment	Triglyceride	Phospholipid	Total cholesterol	Free fatty acid
		(mg/100 ml)		
Fed	236.4±24.4	419.9±12.6	177.8±8.8	15.0±0.9
Fasted	93.0± 2.9**	304.5±15.6**	189.3±5.8	22.3±0.7**
		(% of total lipid)		
Fed	27.8±1.7	49.5±2.1	20.9±1.3	1.8±0.2
Fasted	15.3±2.5**	50.0±2.0	31.1±1.1**	3.6±0.4**

Values are means±S.E.M. of four chicks. **: Significant with respect to fed chicks. (P<0.01).

increased 1.5-fold by fasting.

Experiment 3: The changes in triglyceride synthesis and fatty acid oxidation in chick liver *in vivo* and *in vitro* by fasting are shown in Table 6. The incorporation of [$1-^{14}\text{C}$] acetate into total fatty acid decreased by 95% *in vivo* and by 96% *in vitro* by fasting, respectively. The incorporation of [$1-^{14}\text{C}$] palmitate into triglyceride decreased by 96% *in vivo* and by 97% *in vitro* by fasting. As shown in Table 6, the oxidation of [$1-^{14}\text{C}$] palmitate to CO_2 was enhanced 4.2-fold *in vivo* and 5.7-fold *in vitro* by fasting.

Discussion

There was a marked decrease in abdominal adipose tissue weight during 3 days of fasting (Table 1 A). But there was no difference in the tissue weight between a 2-day or a 3-day fasting. Therefore, 2 days was chosen as the fasting duration. The alteration in abdominal adipose tissue weight in the present experiment is essentially in accord with previous reports^{17,18,33}. Fasting caused an increase in plasma free fatty acid concentration which reached a peak after 1 day. And, after reach-

ing a peak, there was a decline in the plasma free fatty acid concentration to the pre-fasting level (Table 1 A). This result is similar to those described earlier in chicks^{1,19,24,33}.

As shown in Tables 2 A and 2 B, fasting significantly decreased the dry matter content per DNA in adipose tissue without affecting the total DNA content. Among the components of dry matter, a marked decrease was observed in lipid content. VENDREY³⁴ has reported that the DNA content of the fat pad is used to measure its cellular development on the assumption that DNA content is constant on a cellular basis. In other words, the total amount of DNA might indicate the cell number, and the dry matter/DNA ratio might indicate the cell size. The results described above indicate that the decrease in adipose tissue weight by fasting is a consequence of decreased cell size, being due chiefly to the decrease in lipid content. Table 3 indicates that fasting significantly decreased the triglyceride content per DNA, which occupied the largest portion of the adipose tissue lipid. This indicates that the decrease in lipid content is due mainly to the decrease in triglyceride

Table 6. Effect of fasting on triglyceride synthesis and fatty acid oxidation in the chick liver (Experiment 3)

		Treatment	
		Fed	Fasted
Liver weight	g	5.74 $\pm$ 0.25	4.81 $\pm$ 0.21*
Liver DNA	mg	28.2 $\pm$ 2.0	22.4 $\pm$ 1.6
Liver triglyceride	mg	30.5 $\pm$ 6.3	9.2 $\pm$ 4.3*
Fatty acid synthesis from acetate			
<i>in vivo</i>	10^3 dpm/mg DNA	0.91 $\pm$ 0.24	0.05 $\pm$ 0.03*
<i>in vitro</i>	nmol/mg DNA/2 hrs	263 $\pm$ 39	11 $\pm$ 2**
Triglyceride synthesis from palmitate			
<i>in vivo</i>	10^4 dpm/mg DNA	1.36 $\pm$ 0.15	0.06 $\pm$ 0.01**
<i>in vitro</i>	nmol/mg DNA/2 hrs	23.5 $\pm$ 1.3	0.8 $\pm$ 0.05**
Palmitate oxidation to CO_2			
<i>in vivo</i>	10^4 dpm/10 min/100 g BW	1.24 $\pm$ 0.31	5.18 $\pm$ 0.12**
<i>in vitro</i>	nmol/mg DNA/2 hrs	1.05 $\pm$ 0.16	6.03 $\pm$ 0.18**

Values are means $\pm$ S.E.M. for four chicks. *: Significant with respect to fed chicks. (0.05>P>0.01).

** : Significant with respect to fed chicks. (P<0.01).

content.

Decreased triglyceride in the adipose tissue can occur due to the following factors; (a) a reduced rate of fatty acid uptake from blood, (b) an enhanced rate of fatty acid output into blood, (c) a decrease in blood triglyceride concentration, (d) a reduced rate of *de novo* triglyceride synthesis and/or enhanced rate of fatty acid oxidation in the adipose tissue and (e) the combination of (a)–(d).

Since the avian adipose tissue has very low lipogenesis and fatty acid oxidation^{21,25,37)} activities, we first examined the contribution of factors (a) and (b) to decreased triglyceride in the adipose tissue by fasting. It is well known that the uptake of fatty acid from plasma triglyceride is mediated by LPL, and that the output of fatty acid from adipose tissue triglyceride is regulated by HSL^{28,29)}. In mammals, it is well established that LPL activity in the adipose tissue decreases when animals are starved^{6,7,11,15)}. As shown in Table 4, fasting significantly reduced LPL activity in the adipose tissue. This result well supports the report by BORRON *et al.*²⁾ who showed that LPL activity in the chicken adipose tissue is reduced by fasting for 12 or 72 hours. There have been similar reports by other workers^{15,16)} of a reduction in LPL activity in the chicken adipose tissue by fasting. The influences of fasting on HSL activity in the adipose tissue have been well studied in mammals^{26,29,35)}, although there are discrepancies among the effects of fasting on HSL activity in the adipose tissue. On the contrary, in avian species, there is no information with regard to the effects of fasting on HSL activity in the adipose tissue. Our results showed that fasting significantly reduced HSL activity in the adipose tissue (Table 4). This result is similar to the reports of STEFFEN *et al.*³¹⁾ and LARKING and NYE²⁰⁾ who showed that HSL activity in the adipose tissue in swines and in rats tends to be reduced by fasting for 24 or 72 hours. On the contrary, RIZACK³⁰⁾ reported that more HSL activity could

be extracted from the fat pads of starved rats than from those of fed rats. But, OKUDA *et al.*²⁷⁾ found that changes in HSL activity are significantly influenced by the way in which the activity is expressed. In the RIZACK report, HSL activity is expressed per wet weight of the adipose tissue. However, when expressed on a per cell basis, there is a possibility that the HSL activity of starved rats is lower than that of fed rats. This is because the wet weight of the adipose tissue greatly decreases during fasting whereas the cell number of the adipose tissue doesn't change. As shown in Table 4, the LPL/HSL activity ratio showed no change by fasting, being essentially in accord with the observation described above (Table 1B), although fat deposition in the adipose tissue was decreased. This result is different from the report of PATTEN²⁹⁾ who has suggested that LPL and HSL in the adipose tissue show reciprocal change, and that a reduction in the LPL/HSL activity ratio would favour the diminution of body fat. But, in his report, lipolytic activity, not the net activity, of HSL was determined. Namely, they estimated the release of fatty acid or glycerol from free fat cells and used this as an index of HSL activity. Therefore, it is difficult to suppose in chicks treated by fasting that the change in LPL/HSL activity ratio is closely associated with changes in fat deposition in the adipose tissue as suggested by PATTEN²⁹⁾ and PAIK and YEARICK²⁸⁾. These results described above suggest that a marked reduction in LPL activity may be one of the factors responsible for the decrease in triglyceride in the adipose tissue by fasting. Secondly, we examined the contribution of factor (c) to the decrease in triglyceride by fasting. Table 5 indicates that there was a marked decrease, approximately 60%, in plasma triglyceride concentration by fasting. This result suggests that in addition to the reduced activity of LPL in the adipose tissue, a marked decrease in the plasma level of triglyceride may also be one of the factors respon-

sible for the decrease in triglyceride in the adipose tissue by fasting.

In chicks, triglyceride is synthesized almost exclusively in the liver, transported in the blood and taken up mainly by the adipose tissue and muscle^{21, 25, 37)}. Table 6 indicates that fasting significantly reduced fatty acid synthesis from acetate in the chick liver *in vivo* and *in vitro*. This result well supports the report of TANAKA *et al.*³²⁾ who showed that fatty acid synthesis from 1-¹⁴C acetate by liver slices is reduced by fasting.

LEVEILLE²²⁾ also reported the reducing effect of fasting on *in vivo* fatty acid synthesis from acetate in the chick liver. As shown in Table 6, fasting significantly reduced triglyceride synthesis from palmitate in the chick liver *in vivo* and *in vitro*. These results suggest that *de novo* triglyceride synthesis, namely triglyceride synthesis from both lipid precursor (fatty acid) and nonlipid precursor (acetate) in the chick liver is reduced by fasting. There was an enhancement in both *in vivo* and *in vitro* palmitate oxidation to CO₂ in the chick liver by fasting (Table 6). These results described above suggest that both a reduced rate of triglyceride synthesis and an enhanced rate of fatty acid oxidation in the liver may be responsible for fasting-induced hypotriglyceridemia.

From the above results, it is reasonable to assume that triglyceride diminution in the adipose tissue by fasting is attributable to the combination of reduced LPL activity in the adipose tissue and decreased triglyceride in plasma resulting from both the reduced rate of triglyceride synthesis and the enhanced rate of fatty acid oxidation in the liver.

Furthermore, it is necessary to investigate the contribution of factor (d) toward the decrease in triglyceride in the adipose tissue by fasting, although avian adipose tissue has very low lipogenesis and fatty acid oxidation^{21, 23, 25)} activities.

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絶食による鶏の脂肪組織の蓄積，特にその化学成分， 脂質成分およびリパーゼ活性に対する影響

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絶食による鶏の体脂肪減少の機構を調べる目的で，絶食処理鶏の腹腔内脂肪組織を用いて，その化学成分，脂質成分，リパーゼ（リボプロテインリパーゼとホルモン感受性リパーゼ）活性および肝臓トリグリセリド合成能の変化を検討した。3週齢の白色レグホーン雄雌を用い，2日間の絶食を行なった。絶食により，腹腔内脂肪組織量は有意に減少した。化学成分において，総DNA量に変化はなかったが，DNA単位重量当りの乾物量に有意な減少が見られた。さらに乾物成分のうち，乾物の約90%を占める脂質の減少が顕著で，対照区の41%の値を示した。また，脂質成分では，脂質の大部分を占めるトリグリセリドに顕著な減少が認められ，対照区の41%の値を示した。従って，絶食による腹腔内脂肪組織量の減少は，主としてトリグリセリド量の減少に基づいた，細胞容量の減少によるものであることが示唆された。リボプロテインリパーゼおよびホルモン感受性リパーゼは，対照区に対して，おのおの18%および21%の活性値を示したが，（リボプロテインリパーゼ）/（ホルモン感受性リパーゼ）活性比に変化は認められなかった。また，血漿トリグリセリド濃度は，絶食により61%の減少を示した。さらに，絶食により，肝臓トリグリセリド合成能は90%以上減少したが，肝臓脂肪酸酸化分解能は約5倍に増加した。以上の結果に基づき，絶食による，腹腔内脂肪組織における，トリグリセリドの減少機構について考察した。

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