
# Effect of Different Energy in Diet on Internal Organs Development and the Proportion of Breast Muscle Leg Muscle and Nutritional Components of Saibei Silkies

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**Key words:** Energy level, Saibei Silkies China, breast muscle percentage, leg muscle percentage, fatty acid internal organs development

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**Abstract:** Study on nutrition metabolic rates breast muscle leg muscle and fatty acid of Saibei silkies from different Nutrition Energy (NE) levels in diet. The result showed: Nitrogen metabolic Rates of female was 56.08% when ME was 11.51 MJ $kg^{-1}$ but male was 49.31% when ME was 12.34 MJ $kg^{-1}$; energy were highest both female and male when ME was 12.98 MJ $kg^{-1}$, metabolism energy was highest. There were significant differences in the gizzard weight proventriculus weight duodenal length jejunum length ileum length cecal length duodenal weight jejunum weight ileum weight cecal weight gizzard relative weight duodenal relative weight jejunum relative weight ileum relative weight ileum relative weight cecal relative weight between LN and HN $p<0.01$ LN slaughter percentage and the whole net carcass rate was high, breast muscle percentage of both and leg muscle percentage of male were increased by increasing ME but leg muscle percentage of female was not. HN crude protein contents of leg muscle of both were increased ($p<0.05$). ALA LA AA EPA DHA were highest when NE was 12.34 and 12.96 MJ $kg^{-1}$. Essential fatty acid of leg muscle were higher than its in breast muscle. So, muscle of Saibei silkies can change ration balance of unsaturated fatty acids in body.

## INTRODUCTION

Saibei Silkies is a new line being bred and improved for years which is suitable for the ecological environment of the Northwest of Hebei Province. Saibei Silkies's muscle is nutritious and has the role in drugs make. Good or bad of its meat have many influencing factors, especially dietary energy and protein levels are the most important factors affecting broiler carcass quality. Nutritional needs and nutrition. But studies of impact of nutrition and nutrition need of Saibei Silky on their growth and development and production targets are fewer, this test is designed to examine effect of dietary energy levels on muscle quality, its innovation is that provide the basis for the development of energy nutrition standards of Saibei Silkies from the view of the metabolism of nutrients and which regulate product quality through energy levels in the diet, so the study can the nutrition and health value of Saibei Silkies and increase the value of the products and improves the profits of producers.

## MATERIALS AND METHODS

Grouping and manage The test was conducted in the experimental ranch of Hebei North University for 110 days, 400 Saibei Silkies 1 day old were selected, male and female were same. Both were randomly divided into 5 groups with 4replications according with different levels of nutrition energy. Saibei Silkies wear winged No. after being respectively weighed, the weight difference was not significant. Test brood of captive and captive-bred manner, free food and water, the immune and management of the whole process were carried out routinely.

**Experimental diets:** Broilers diets formulated with reference to the US. NRC Silkies keeping consistent standard of protein levels but energy levels were 10.38, 10.94, 11.51, 12.34 and 12.96 MJ $kg^{-1}$, diet formulations are shown in Table 1 and 2.

**Experimental design:** The test process is divided into two phases, when female was in brooding period, NE was 12.96 MJ $kg^{-1}$ three weeks before and CP was 20%, CP was 18% during later 3 weeks. In the diet of male, NE was 11.51MJ $kg^{-1}$, CP was 20%. In finishing period, NE was 10.38, 10.94, 11.51, 12.34 and 12.96 MJ $kg^{-1}$, CP was 16.15% in the diet.

**Feeding and management:** Test chickens captive, unified dewormed, immunization routine immunization program, were fed different energy levels (10.38 and 10.94 MJ $kg^{-1}$ and 11.51 and 12.34 MJ $kg^{-1}$ and 12.96 MJ $kg^{-1}$) in test diets, fed twice a day, each was at 6:00 and 18:00 Record the actual feed intake daily. Free access to water, to be tested the chicken feed properly into formal test. The test is divided into the pre-trial period and the positive trial period, the pre-test period was l5 days, the pre-trial of dietary was accordant with dietary standards in the brooding period, the trial period was 70 days, The digestion and metabolism test used total feces collection method which was conduct for 7 days. Maintain clean, well ventilated.

**Determination of nutrient metabolism:** Collection of test samples: Start feeding after the 6:00 in the first morning of the positive test, the next day, we start to collect leftover material, fecal samples, daily defecation quantity and the remaining quantity were weighed and recorded everyday, two times, morning and evening, they were finished before feed, for seven consecutive days, samples are saved after accurate weighed and sampled proportionally. Taking groups of fecal to be dried , so they will be used later.

**Treatment of the test sample**

**leftover material:** The collection leftover material of daily were mixed and reduced, the sample was dried in a dry place to and was prepared to analyze samples.

**Fecal samples:** Fresh fecal samples of daily were collected and weighed, the 10% was test sample which was dried and baked for 24 h after 65 , the sample was weighed when resurgence being finished in the laboratory after 24 h, measured initial moisture, crushed, over a 40-mesh sieve, made into the analysis samples, kept under seal and prepared for laboratory analysis.

Table 1: Composition of diets in growing period

| Ingredients (% ) | Formula I | Formula II | Formula III | Formula IV | Formula V |
|---|---|---|---|---|---|
| Corn | 50.0 | 57.5 | 65.0 | 60.635 | 56.27 |
| Soybean meal | 11.0 | 13.0 | 15.0 | 13.41 | 11.81 |
| Premix | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| Flaxseed flake | 2.0 | 2.0 | 2.0 | 3.5 | 5.0 |
| Cottonseed meal | 2.0 | 2.0 | 2.0 | 3.5 | 5.0 |
| Linseed meal | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| Wheat bran | 25.0 | 15.5 | 6.0 | 5.51 | 5.02 |
| Vegetable oil | 0.0 | 0.0 | 0.0 | 3.46 | 6.92 |
| Stone powder | 2.0 | 2.0 | 2.0 | 1.995 | 1.99 |

premix: $FeSO_4 \cdot 7H_20$ 170 g $kg^{-1}$; $CuSO_4 \cdot 5H_20$ 70 g $kg^{-1}$; $MnS0_4 \cdot 5H_20$ 290 g $kg^{-1}$; $ZnS0_4 \cdot 7H_20$ 240 g $kg^{-1}$; $CoCL_2 \cdot 6H_20$ 510 mg $kg^{-1}$; $K_I$220 mg $kg^{-1}$; $Na_2SeO_3$ 130 mg $kg^{-1}$; Vitamin A 620000IU $kg^{-1}$; Vitamin D3 324 000IU $kg^{-1}$; Vitamin E 540IU $kg^{-1}$; vitamin $K_3$ 150 mg $kg^{-1}$; vitamin $B_1$ 60 mg $kg^{-1}$; Vitamin $B_2$ 450 mg $kg^{-1}$; Vitamin $B_{12}$ 0.9 mg $kg^{-1}$; Vitamin $B_5$ 1050 mg $kg^{-1}$; calcium pantothenate 750 mg $kg^{-1}$; folic acid 15 mg $kg^{-1}$

Table 2: Nutrient levels of diets in growing period

| Nutrient levels | I | II | III | a IV | V |
|---|---|---|---|---|---|
| metabolizable energy MJ $kg^{-1}$ | 10.38 | 10.94 | 11.51 | 12.34 | 12.96 |
| Crude protein/% | 16.14 | 16.16 | 16.18 | 16.17 | 16.170 |
| Ca/% | 0.78 | 0.78 | 0.78 | 0.78 | 0.78 |
| P/% | 0.46 | 0.46 | 0.46 | 0.46 | 0.46 |

The values in the table were measured

**Determination of the daily body weight gain:** Saibei Silkies were fasting weighed for two consecutive months morning at feeding trial start and end, average value were used for the quality of the body at start and end of the test.

**Determination of energy metabolism:** The determination of energy in diets, leftover materials fecal samples: used GR-3500 oxygen bomb calorimeter produced by Changsha Instrument Factory production; The determination of nitrogen in diets, leftover materials fecal samples: measured with the azotometer (Kjeldahl method).

**The determination of fat metabolism:** At 8 week day, calculated on the consumption of materials a daily basis and collected manure droppings, dried at 65, moisture regain, weighed, grinded, the fat content of feed and manure were measured by Soxhlet extraction method and calculated the apparent rate of fat metabolism. Fecal crude fat content (%) = fecal ether extract weight (g)/oven dry fecal sample weight (g)×100%.

**Slaughter test** The measurement of muscle protein, muscle fat At the end of the 16 week day, male and female were randomly selected in each of five were starved for 12 h, weighted live weight, then went on the slaughtering test. Through weighting the carcass weight, whole eviscerated weight, breast muscle weight and leg muscle weight, calculated dressing percentage, whole net carcass rate, breast muscle percentage and leg muscle percentage. Protein content was determined by Kjeldahl method (FOSS); Fat content. was measured by Soxhlet extraction method.

**The determination of fatty acids:** The 16 weekend, the breast and leg muscle of similar weight, the same number of male and female in each repetition were taken, minced by using tissue masher, each precisely weighed 50 g, joined the Folch solution was homogenized, centrifuged and collected the extract solution with dehydration by $Na_2SO_4$ which was constant volume and constant quantitative, determination of total lipid. Then esterified measured by using 0.5 mol $L^{-1}$ KOH-$CH_3OH$ typed by using Hp1100 liquid chromatograph (USA), methyl ester Methyl standard production are produced by NU-CHEK, used area normalization method.

**The determination of digestive organs relative weight and small intestine length determination**

**The determination of digestive organs relative weight:** Slaughtered at the end of 16-week-old, accurate weighed the weight of proventriculus, muscular stomach, duodenum, jejunum, ileum and cecum and measured the length of duodenum, jejunum, ileum, record the absolute length and calculated the relative weight of each organ. Calculated as follows: proventriculus relative the weight = Proventriculus weight/live weight×100%; gizzard relative weight = gizzard weight/live weight×100%; duodenum relative weight = duodenum weight/live weight 100%; the jejunum relative weight = the jejunum weight/live weight×100%; the ileum relative weight = the ileum weight/live weight×100%; the cecum relative weight = cecal weight/live weight×100%.

**The determination of the small intestine length**

**Duodenal length:** the distance from the bottom of the muscular stomach to the duodenum.

**Jejunum length:** loop from the duodenum liter to yolk sac diverticulum distance.

**Ileum length:** Combined with the Ministry of the distance from the yolk sac diverticulum to the ileocecal straight.

**Cecal length:** straight from the ileocecal junction to the cecum distalis distance.

**Data analysis:** All data were analyzed by one-way ANOVE followed by fish s protected LSD for mean comparisons SPSS 11.5 was used for the analysis.

## RESULTS

**Effects of different NE on N balance of Saibei Silkies:** Table 3 showed that the dry matter in groups respectively were 394.98, 293.62, 286.78, 284.78 and 215.56 g $d^{-1}$, differences among the other groups were not significant ($p>0.05$). But the difference with. group was highly significant (p 0.01). Ingestion nitrogen in I and II, III, IV, groups were significant ($p<0.05$) but the difference with .group was highly significant (p 0.01). Manure nitrogen in group and group were significantly different ($p<0.05$), the difference with group was highly significan t (p 0.01). The metabolic nitrogen in group was the highest and the deposition nitrogen in group was the highest, of the apparent metabolic rate of nitrogen in III group was the highest. From the nitrogen balance, they all were positive balance which could promote body weight gain.

Table 4 showed that the dry matter in each group respectively was 327.66, 318.78, 314.66, 325.50 and 243.93 g $d^{-1}$, differences among other groups were not significant ($p>0.05$).but the difference with group was highly significant (p 0.01). Ingestion nitrogen in group and group were significant ($p<0.05$), the difference with .group was highly significant(p 0.01).Differences of manure nitrogen in group with group and V group were significant ($p<0.05$). The metabolic nitrogen in group was highest, deposition nitrogen in group was the highest, nitrogen digestibility in group was the highest. From the nitrogen balance, they all were positive balance which could promote body weight gain.

Table 3: Effects of different NE on N balance of female

| Items | I group | II group | III group | IVgroup | V group |
|---|---|---|---|---|---|
| Dry matter(g $d^{-1}$) | 294.98±6.13$^{c}$ | 293.62±10.19$^{c}$ | 286.78±12.63$^{c}$ | 284.78±19.7$^{c}$ | 215.56±18.70$^{a}$ |
| Food nitrogen (g $d^{-1}$) | 7.46±0.16$^{a}$ | 7.06±0.26$^{a}$ | 6.83±0.32$^{a}$ | 6.76±0.49$^{a}$ | 5.05±0.46$^{c}$ |
| Manure nitrogen (g $d^{-1}$) | 3.65±0.83$^{a}$ | 3.50±0.55$^{a}$ | 3.00±0.17$^{b}$ | 3.10±0.55$^{b}$ | 2.55±0.58$^{c}$ |
| Metabolic nitrogen (g $d^{-1}$) | 3.81±2.69 | 3.56±2.52 | 3.83±2.71 | 3.66±2.59 | 2.5±1.77 |
| Deposition nitrogen (g $d^{-1}$) | 2.83±0.92 | 2.21±0.71 | 2.35±0.24 | 2.89±0.95 | 2.32±0.62 |
| Apparent metabolic rate (%) | 51.07±2.58 | 50.42±2.47 | 56.08±2.12 | 54.14±2.19 | 49.51±1.80 |

Standard error. $^{a,b}$Means in the same row with different superscripts differ ($p<0.05$). The same was below

Table 4: Effects of different NE on N balance of male

| Items | I group | II group | III group | IV group | V group |
|---|---|---|---|---|---|
| Dry matter(g $d^{-1}$) | 327.66±19.02$^{a}$ | 318.78±19.94$^{a}$ | 314.66±20.32$^{a}$ | 325.50±21.74$^{a}$ | 243.93±27.63$^{c}$ |
| Food nitrogen (g $d^{-1}$) | 8.28±0.51$^{a}$ | 7.66 ±0.51$^{b}$ | 7.50±0.51$^{b}$ | 7.73±0.55$^{b}$ | 6.71±0.69$^{c}$ |
| Manure nitrogen (g $d^{-1}$) | 5.90±1.56$^{a}$ | 4.09±0.72$^{b}$ | 3.90±0.21$^{b}$ | 3.92±0.17$^{b}$ | 3.45±0.38$^{b}$ |
| Metabolic nitrogen (g $d^{-1}$) | 2.38±1.68 | 3.57±2.55 | 3.60±2.34 | 3.81±2.52 | 3.26±2.45 |
| Deposition nitrogen (g $d^{-1}$) | 2.29±1.72 | 3.27±0.70 | 2.67±0.65 | 3.29±0.62 | 3.02±0.68 |
| Apparent metabolic rate (%) | 28.74±4.17 | 46.61±2.89 | 48.02±2.76 | 49.31±3.13 | 48.59±1.509 |

Table 5: Effects of different NE on energy digestion and metabolism of female

| Items | I group | II group | III group | IV group | V group |
|---|---|---|---|---|---|
| Food dry matter (g $d^{-1}$) | 294.98±6.13$^{c}$ | 293.62±10.19$^{c}$ | 286.78±12.63$^{c}$ | 284.78±19.7$^{c}$ | 215.56±18.70$^{a}$ |
| Total energy (MJ $d^{-1}$) | 15.36±0.48 | 15.16±0.38 | 15.57±0.55 | 15.87±0.54 | 16.45±0.71 |
| Energy (MJ $d^{-1}$) | 13.86±0.24$^{b}$ | 13.69±0.34$^{b}$ | 14.04±0.29$^{a}$ | 14.86±0.24$^{a}$ | 14.74±0.31$^{a}$ |
| FE/GE | 90.21 ±1.08$^{a}$ | 90.39±0.40$^{a}$ | 90.15±1.09$^{a}$ | 93.67±0.79$^{a}$ | 85.36±1.72$^{b}$ |
| Metabolic energy (MJ $d^{-1}$) | 1.51±0.23$^{b}$ | 1.47±0.20$^{b}$ | 1.53±0.25$^{b}$ | 1.02±0.21$^{c}$ | 1.71±0.31$^{a}$ |
| NE/GE | 9.83±1.05$^{a}$ | 9.68±1.11$^{a}$ | 9.83±1.06$^{a}$ | 6.43±1.12$^{c}$ | 10.42±1.06$^{a}$ |

Table 6: Effects of different NE on energy digestion and metabolism of male

| Items | I group | II group | III group | IV group | V group |
|---|---|---|---|---|---|
| Food dry matter (g $d^{-1}$) | 327.66±19.02$^{a}$ | 318.78±19.94$^{a}$ | 314.66±20.32$^{a}$ | 325.50±21.74$^{a}$ | 243.93±27.63$^{c}$ |
| Total energy (MJ $d^{-1}$) | 16.376±0.49 | 16.262±0.36 | 16.586±0.53 | 16.988±0.57 | 17.474±0.69 |
| Energy (MJ $d^{-1}$) | 14.179±0.38$^{b}$ | 14.282±0.45$^{b}$ | 14.639±0.47$^{a}$ | 14.924±0.53$^{a}$ | 15.056±0.59$^{a}$ |
| FE/GE | 86.58±1.55 | 87.82±1.40 | 88.26±1.38 | 87.85±1.46 | 86.16±1.71 |
| Metabolic energy (MJ $d^{-1}$) | 2.197±0.37$^{b}$ | 1.98± 0.29$^{b}$ | 1.947±0.23$^{b}$ | 2.064±0.42$^{b}$ | 2.418±0.47$^{a}$ |
| NE/GE | 13.42±1.00$^{a}$ | 12.18±1.01$^{a}$ | 11.74±1.04$^{b}$ | 12.15±1.06$^{a}$ | 13.84±1.07$^{a}$ |

Table 7: Effects of different NE on fat digestion and metabolism of male

| Items | I group | II group | III group | IV group | V group |
|---|---|---|---|---|---|
| Dry matter (g $d^{-1}$) | 327.66±19.02$^{a}$ | 318.78±19.94$^{a}$ | 314.66±20.32$^{a}$ | 325.50±21.74$^{a}$ | 243.93±27.63$^{c}$ |
| Food fat (g $d^{-1}$) | 7.99±0.65$^{e}$ | 7.94±0.81$^{e}$ | 7.09±0.46$^{e}$ | 19.71±1.34$^{c}$ | 23.62±2.68$^{a}$ |
| Fecal fat (g $d^{-1}$) | 2.03±0.51$^{a}$ | 1.51±0.25$^{c}$ | 1.78±0.12$^{ab}$ | 1.86±0.17$^{a}$ | 0.98±0.18$^{e}$ |
| Metabolic fat (g $d^{-1}$) | 5.97±0.89$^{e}$ | 6.42±0.80$^{e}$ | 5.31±0.53$^{e}$ | 17.85±1.40$^{c}$ | 22.64±2.64$^{a}$ |
| Apparent metabolic rate (%) | 74.41±6.96$^{g}$ | 80.80±3.39$^{e}$ | 74.72±2.79$^{g}$ | 90.49±1.23$^{c}$ | 95.82±0.73$^{a}$ |

**Effects of different NE on energy metabolism of Saibei Silkies:** Table 5 showed that, the total energy in group was the highest which was17.474 MJ $d^{-1}$, but the difference between the five groups was not significant ($p> 0.05$). The excretion of Fecal Energy (FE) in group was the highest, group and group was significantly different ($p<0.05$) with the other two groups difference was not significant ($p>0.05$). The ratio ingestion of FE/GE in group was the highest which and group had differences significant ($p<0.05$) but with the other groups, the difference was not significant ($p>0.05$). Metabolic energy in group was the highest, differences with~group were significant ($p<0.05$) and the difference with IV group was highly significant(p 0.01). The ratio of metabolic energy/the total energy (NE/GE) were 9.83%, 9.68, 9.83, 6.43 and 10.42%, respectively.

Table 6 showed that: the total energy in group was the highest which was17.474MJ $d^{-1}$ but the difference between the five groups was not significant ($p> 0.05$). The excretion of Fecal Energy (FE) in group was the highest, group and group was significantly different ($p<0.05$) with the other two groups difference was not significant ($p>0.05$).The ratio ingestion of FE/GE in group was the highest which and group had differences significant ($p<0.05$) but with the other groups, the difference was not significant ($p>0.05$). Metabolic energy in group was the highest, differences with~group were significant ($p<0.05$) and the difference with IV group was highly significant(p 0.01). The ratio of metabolic energy/the total energy (NE/GE). Were 13.42, 12.18, 11.74, 12.15 and 13.84%, III group and the other four groups was significantly different ($p<0.05$).

**Effects of different NE on fat metabolism of Saibei Silkies:** Table 7 showed that: the dDry matter of Saibei Silkies male 8 week old \in group was least,

Table 8: Effects of different NE on fat digestion and metabolism of female

| Items | I group | II group | III group | IV group | V group |
|---|---|---|---|---|---|
| Dry matter (g $d^{-1}$) | 294.98±6.13$^{c}$ | 293.62±10.19$^{c}$ | 286.78±12.63$^{c}$ | 284.78±19.7$^{c}$ | 215.56±18.70$^{a}$ |
| Food fat (g $d^{-1}$) | 7.20±0.43$^{e}$ | 7.31±0.64$^{e}$ | 6.47±0.29$^{e}$ | 17.24±1.21$^{c}$ | 20.88±1.82$^{a}$ |
| Fecal fat (g $d^{-1}$) | 1.01±0.22$^{d}$ | 1.27±0.24$^{c}$ | 1.31±0.09$^{c}$ | 1.85±0.31$^{a}$ | 0.75±0.22$^{e}$ |
| Metabolic fat (g $d^{-1}$) | 6.18±0.51$^{e}$ | 6.04±0.59$^{e}$ | 5.16±0.25$^{e}$ | 15.39±1.44$^{c}$ | 20.13±1.79$^{a}$ |
| Apparent metabolic rate (%) | 85.83±3.32$^{e}$ | 82.62±2.96$^{g}$ | 79.78±1.13$^{h}$ | 89.12±2.47$^{c}$ | 96.39±1.08$^{a}$ |

Table 9: Effects of different NE level on Slaughter performance of growing male

| Items | I group | II group | III group | IV group | V group |
|---|---|---|---|---|---|
| Live weight/g$^{-*1}$ | 1087±30.33$^{e}$ | 1132±14.83$^{c}$ | 1210±24.49$^{b}$ | 1240±18.71$^{a}$ | 1224±18.17$^{b}$ |
| Carcass weight g$^{-*1}$ | 975.4±7.99$^{e}$ | 1018.6±24.03$^{d}$ | 1073.4±13.16c | 1101.3±63.68$^{a}$ | 1067.8±27.7$^{c}$ |
| Slaughter rate (%) | 89.96±0.84$^{a}$ | 89.94±0.83$^{ab}$ | 88.60±0.50$^{ab}$ | 88.95±2.93$^{ab}$ | 87.73±0.68$^{b}$ |
| Eviscerated weigh g$^{-1}$ | 875.42±14.43$^{g}$ | 926.12±4.61$^{e}$ | 958.88±9.97$^{bc}$ | 995.46±26.12$^{a}$ | 963.86±10.42$^{c}$ |
| Eviscerated ration/% | 80.26±0.22$^{c}$ | 81.66±0.85$^{a}$ | 78.91±0.46$^{e}$ | 80.45±0.79$^{c}$ | 79.09±0.77$^{e}$ |
| Pectoral muscle weight g$^{-1}$ | 99.7±5.53$^{d}$ | 118.32±2.44$^{b}$ | 125.26±3.28$^{a}$ | 117.28±4.54$^{b}$ | 123.56±4.24$^{a}$ |
| Pectoral muscle ration (%) | 11.33±0.63$^{c}$ | 12.82±0.18$^{a}$ | 13.01±0.23$^{a}$ | 11.80±0.44$^{c}$ | 12.86±0.34$^{a}$ |
| Leg muscle weight g$^{-1}$ | 161.94±5.95$^{c}$ | 188.16±5.37$^{b}$ | 196.56±3.85$^{ab}$ | 201.56±4.95$^{a}$ | 199.82±3.46$^{a}$ |
| Leg muscle ration (%) | 18.40±0.58$^{c}$ | 20.46±0.44$^{a}$ | 20.71±0.35$^{a}$ | 20.21±1.07$^{a}$ | 20.77±0.24$^{a}$ |

Table 10: Effects of different NE level on Slaughter performance of growing female

| Items | I group | II group | III group | IV group | V group |
|---|---|---|---|---|---|
| Live weight/g$^{-*1}$ | 914±13.42$^{c}$ | 924±18.17$^{c}$ | 956±11.4$^{a}$ | 962±8.37$^{a}$ | 964±11.4$^{a}$ |
| Carcass weight g$^{-*1}$ | 805.2±7.92$^{c}$ | 804.40±15.19$^{c}$ | 838.20±30.30$^{a}$ | 832.4±7.50$^{ab}$ | 838.6±10.06$^{a}$ |
| Slaughter rate (%) | 88.10±0.53 | 87.07±1.63 | 87.67±2.86 | 86.53±0.51 | 86.99±0.94 |
| Eviscerated weigh g$^{-1}$ | 669.4±2.19$^{e}$ | 671.64±4.80$^{e}$ | 690.48±14.05$^{abd}$ | 696.08±16.87$^{ab}$ | 698.8±15.54$^{a}$ |
| Eviscerated ration (%) | 73.25±0.93 | 72.70±0.94 | 72.23±0.91 | 72.35±1.18 | 72.49±1.18 |
| Pectoral muscle weight g$^{-1}$ | 88.14±1.44$^{c}$ | 90.42±4.91$^{c}$ | 99.62±1.60$^{a}$ | 99.28±2.71$^{a}$ | 99.42±2.64$^{a}$ |
| Pectoral muscle ration (%) | 13.17±0.18$^{f}$ | 13.46±0.64$^{bf}$ | 14.43±0.22$^{d}$ | 14.27±0.60$^{cd}$ | 14.23±0.55$^{ad}$ |
| Leg muscle weight g$^{-1}$ | 132.88±4.42 | 135.68±9.64 | 133.96±8.54 | 133.96±5.06 | 135.12±6.11 |
| Leg muscle ration (%) | 19.85±0.61 | 20.20±1.44 | 19.34±0.93 | 19.24±0.53 | 19.33±0.69 |

compared with the other groups, the difference was very significant($p<0.01$); other differences between the groups was not significant ($p>0.05$). Ingestion of fat in group was the highest, followed by group, compared with other groups, the differences were highly significant ($p<0.01$); differences among group were not significant ($p>0.05$). The fecal fat content in group was the highest, group was the lowest, the difference between group and the other groups were very significantly ($p<0.01$); comparison differences between group with group and group were not significant ($p>0.05$); group and and group were extremely significant ($p<0.01$); II group and III group was significantly different ($p<0.05$). The metabolic fat in group was the highest, followed by group and other differences between groups were highly significant ($p<0.01$); differences among, groups were not significant ($p>0.05$). The apparent rate of fat metabolism in group was the highest, followed by group and the third was group, other differences among the groups were extremely significant ($p<0.01$); the difference between I group and III group was not significant ($p>0.05$).

Table 8 showed that the Dry matter of Saibei Silkies female 8 week old in group was least, compared with the other groups, the difference was very significant ($p<0.01$); other differences between the groups was not significant ($p>0.05$). Ingestion of fat in group was the highest, followed by group, compared with other groups, the differences were highly significant ($p<0.01$); differences among, group were not significant ($p>0.05$). The fecal fat content in group was the highest, group was the lowest, the difference between group and the other groups were very significantly ($p<0.01$); comparison differences between group with group and group were very significant ($p<0.01$); the difference with group was significant($p<0.05$); group and group was not significant ($p>0.05$); The metabolic fat in group was the highest, followed by group and other differences between groups were highly significant ($p<0.01$); differences among, groups were not significant ( $p>0.05$). The apparent rate of fat metabolism in group was the highest, followed by group and the third was group, other differences among groups were extremely significant ($p<0.01$); the difference between group and III group was not significant ($p>0.05$).

**Effects of different ne on slaughter performance of Saibei Silkies:** The results of different NE on Slaughter performance of Saibei Silkies are showed in Table 9 and 10. Tables 9 and 10 showed that, except live weight, carcass weight and carcass weight of male and female, dressing percentage, eviscerated yield, breast muscle weight, leg muscle weight, breast muscle rate and leg muscle rate were not changed regularly. The slaughter rate of male among I and group were not significant ($p>0.05$); differences among and group were not significant ($p>0.05$); compare differences between group with group were significant ($p<0.05$). The slaughter rate of female among groups were not significant ($p>0.05$). And the whole carcass weight and live weight was

Table 11: Effects of different NE level on nutritional components in breast muscle leg muscle of growing female (%)

| Items | I group | II group | III group | IV group | V group |
|---|---|---|---|---|---|
| Pectoral muscle protein | 0.86±0.004[a] | 0.84±0.006[b] | 0.84±0.007[b] | 0.82±0.011[d] | 0.85±0.009[b] |
| Pectoral muscle fat | 0.01±0.0002 [f] | 0.014±0.0009 [e] | 0.02±0.0032[c] | 0.029±0.0024[a] | 0.01±0.0022[f] |
| Leg muscle protein | 0.75±0.02[cf] | 0.79±0.004[a] | 0.73±0.005[ef] | 0.74±0.011[fe] | 0.76±0.008[c] |
| Leg muscle fat | 0.082±0.0036[e] | 0.085±0.0021[e] | 0.1139±0.0026[c] | 0.125±0.0019[a] | 0.084±0.0024[e] |

Table 12: Effects of different NE level on nutritional components in breast muscle leg muscle of growing male (%)

| Items | I group | II group | III group | IV group | V group |
|---|---|---|---|---|---|
| Pectoral muscle protein | 0.853±0.004[ab] | 0.84±0.006[b] | 0.855±0.017[a] | 0.853±0.007[ab] | 0.854±0.005[a] |
| Pectoral muscle fat | 0.009±0.0008[e] | 0.023±0.0047[a] | 0.012±0.0036[ec] | 0.015±0.0006[c] | 0.012±0.0012[ec] |
| Leg muscle protein | 0.781±0.005[a] | 0.729±0.014[d] | 0.792±0.004[a] | 0.754±0.018[c] | 0.793±0.012[a] |
| Leg muscle fat | 0.068±0.0013[e] | 0.09±0.0006[c] | 0.066±0.0026[f] | 0.102±0.0018[a] | 0.05±0.0012[h] |

positively correlated, eviscerated weight of female and NE showed a positive correlation. The eviscerated yield of male in group was significantly greater than the other groups (p<0.01), and group was significantly lower than that in group and group (p<0.01); the eviscerated yield of female among groups were not significant (p>0.05). The pectoral muscle weight of male in group was maximum which was minimum in group, the comparison difference between group and group was not significant (p>0.05), group and group was not significant (p>0.05); The breast muscle weight in group of female was minimum, group and group was not significant (p>0.05), compare differences among and group were not significant (p>0.05) with group and and group were extremely significant significantly (p<0.01). The pectoral muscle rate of male in group were not significant (p>0.05), the difference between group and group was not significant (p>0.05), group were extremely higher than and group (p<0.01); the breast muscle rate of female group in group was the highest which in I group was the lowest I group and group were extremely significant (p<0.01). The leg muscle weight of male in group was the highest which in I group was the lowest and group were significant (p<0.05), group and group was not significant (p>0.05); the leg muscle weight of female among groups were not significant (p>0.05). The leg muscle rate of male in group was the lowest, compare differences with the other groups were extremely significant (p<0.01), other group differences were not significant (p>0.05); the leg muscle rate of female among groups were not significant (p>0.05).

**Effects of different NE on nutritional components in breast muscle leg muscle of Saibei Silkies:** The results of different NE on nutritional components in breast muscle leg muscle of Saibei Silkies are showed in Table 11 and 12.

Table 11 and 12 showed that there were not regularity between dietary energy levels and pectoral muscle and leg muscle protein of Saibei Silkies, differences among I group, II and group were not significant (p>0.05), group and group differences are not significant with (p>0.05), group and with group were significant (p<0.05); The breast muscle protein of female in group was the highest which in group was the lowest , compare differences with other groups were very significant (p<0.01) and group were not significant (p>0.05). The leg muscle protein of male in II group was the lowest whose comparative differences and group were extremely significant (p<0.01) with the group was significant (p<0.05) between and group were not significant (p>0.05); the leg muscle protein of female in group was the highest, comparative differences with the other groups were extremely significant (p<0.01), group and with group were very significant (p<0.01) and group was not significant (p>0.05), differences among and group were not significant (p>0.05). The pectoral muscle fat of male in group was the highest which in group was the lowest, differences among and group were not significant (p>0.05); the breast muscle fat of female were increased along with raising the level of dietary energy content which in group was the highest, the difference between group and V group was not significant (p>0.05) and group were significantly higher than other groups. The leg muscle fat of male in group was the lowest followed by group and differences among other groups were highly significant (p<0.01); the leg muscle fat of female in group was the highest, followed by group and differences among other groups were highly significant (p<0.01), group was the lowest, differences compared with II group and V group were not significant (p>0.05).

**Effects of different NE on fatty acids of SaibeiSilkies**

The results of different NE on fatty acids of SaibeiSilkies are showed in Table 13. Table 13 (in the text after) showed that there were certain effect of dietary energy levels on fatty acids of Saibei Silkies. Compared with the other three groups, the content of polyunsaturated fatty acids of the chest and leg in high-energy group and group which were added vegetable oil in the diet were highly significant (p<0.01) and which were increased by improving the level of dietary energy. The palmitic acid in saturated fatty acids in V group were significantly greater than the other groups (p<0.05), differences among I group II group, group and group were not significant

Table 13: Effects of different NE on breast muscle leg muscle and fatty acid of Saibei Silkies

| | Breast fatty acid quality score (%) groups | | | | | Leg muscle fatty acid quality score (%) groups | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Items | I | II | III | IV | V | I | II | III | IV | V |
| linolenic acid C18:3 | 0.30±0.01$^{g}$ | 0.31±0.02$^{g}$ | 0.42±0.02$^{e}$ | 0.80±0.02$^{c}$ | 1.25±0.01$^{a}$ | 0.32±0.01$^{g}$ | 0.34±0.01$^{g}$ | 0.42±0.02$^{e}$ | 0.88±0.02$^{c}$ | 1.41±0.04$^{a}$ |
| linoleic acid C18:2 | 19.13±0.80$^{g}$ | 19.84±0.67$^{g}$ | 21.34±0.97$^{e}$ | 23.44±0.64$^{c}$ | 25.56±0.85$^{a}$ | 19.44±0.48$^{h}$ | 20.45±0.42$^{g}$ | 22.72±0.44$^{e}$ | 24.62±0.39$^{c}$ | 27.01±0.42$^{a}$ |
| Eicosatetraenoic acid C20:4 | 1.99±0.08$^{h}$ | 2.08±0.06$^{g}$ | 2.40±0.04$^{e}$ | 2.77±0.05$^{c}$ | 3.08±0.06$^{a}$ | 2.10±0.09$^{i}$ | 2.38±0.05$^{g}$ | 2.69±0.08$^{e}$ | 2.87±0.11$^{c}$ | 3.42±0.05$^{a}$ |
| Timnodonic acid C20:5 | 0.89±0.02$^{g}$ | 0.90±0.01$^{g}$ | 1.05±0.02$^{e}$ | 1.21±0.02$^{c}$ | 1.34±0.03$^{a}$ | 0.90±0.01$^{g}$ | 0.93±0.01$^{g}$ | 1.22±0.04$^{e}$ | 1.40±0.03$^{c}$ | 1.51±0.03$^{a}$ |
| DHA C22:6 | 0.50±0.02$^{g}$ | 0.51±0.01$^{g}$ | 0.61±0.02$^{e}$ | 0.65±0.02$^{c}$ | 0.75±0.02$^{a}$ | 0.56±0.05$^{f}$ | 0.61±0.06$^{fe}$ | 0.65±0.02$^{ec}$ | 0.69±0.03$^{c}$ | 0.81±0.01$^{a}$ |
| Palmitic acid C16:0 | 22.16±0.49$^{b}$ | 22.48±0.32$^{b}$ | 22.96±0.45$^{b}$ | 22.19±0.40$^{b}$ | 23.16±0.45$^{a}$ | 22.15±0.61$^{b}$ | 22.53±0.59$^{b}$ | 22.91±0.14$^{b}$ | 22.67±0.39$^{b}$ | 23.47±0.15$^{a}$ |
| Octadecanoic acid C18:0 | 4.05±0.12$^{f}$ | 4.08±0.14$^{fe}$ | 4.30±0.15$^{d}$ | 4.52±0.09$^{cb}$ | 4.86±0.13$^{a}$ | 4.06±0.06$^{g}$ | 4.11±0.02$^{g}$ | 4.41±0.06$^{e}$ | 4.61±0.16$^{c}$ | 5.11±0.03a |
| SFA | 26.21 | 26.56 | 27.26 | 26.71 | 28.02 | 26.21 | 26.64 | 27.32 | 27.28 | 28.58 |
| PUFA | 22.81 | 23.64 | 25.82 | 28.87 | 31.98 | 23.32 | 24.71 | 27.70 | 30.46 | 34.16 |
| EFA | 21.42 | 22.23 | 24.16 | 27.01 | 29.89 | 21.86 | 23.17 | 25.83 | 28.37 | 31.84 |

Table 14: Effects of different NE level on relative weight internal organs (male)

| Items | I group | II group | III group | IV group | V group |
|---|---|---|---|---|---|
| Live weight/g | 1087±30.33$^{e}$ | 1132±14.83$^{c}$ | 1210±24.49$^{b}$ | 1240±18.71$^{a}$ | 1224±18.17$^{b}$ |
| Proventriculus weight /g | 6.02±0.46$^{a}$ | 5.18±0.24$^{c}$ | 4.42±0.28$^{e}$ | 4.00±0.26$^{fh}$ | 3.64±0.29$^{gh}$ |
| Gizzard weight g | 36.24±0.29$^{c}$ | 41.18±0.66$^{a}$ | 31.26±0.33$^{e}$ | 28.38±0.57$^{g}$ | 22.08±0.37$^{i}$ |
| Duodenum weight/g | 11.14±0.29$^{c}$ | 13.62±0.76a | 8.10±0.61$^{g}$ | 9.52±0.41$^{e}$ | 7.88±0.70$^{g}$ |
| Jejunumweight /g | 18.2±0.54$^{a}$ | 13.28±0.41$^{c}$ | 13.72±0.43$^{c}$ | 11.30±0.27$^{e}$ | 10.28±0.44$^{g}$ |
| Ileum weight /g | 16.92±0.59$^{a}$ | 13.16±0.48$^{c}$ | 12.62±0.36$^{d}$ | 7.90±0.19$^{f}$ | 7.30±0.19$^{g}$ |
| Cecum weight /g | 15.02±0.64$^{a}$ | 11.94±0.30$^{c}$ | 8.48±0.38$^{e}$ | 8.00±0.25$^{ef}$ | 7.40±0.38$^{g}$ |
| Relative weight of proventriculus (%) | 0.55±0.05$^{a}$ | 0.45±0.02$^{b}$ | 0.35±0.02$^{cd}$ | 0.32±0.03$^{de}$ | 0.30±0.02$^{e}$ |
| Elative weight of gizzard (%) | 3.33±0.04$^{c}$ | 3.63±0.04$^{a}$ | 2.57±0.06$^{e}$ | 2.29±0.1$^{g}$ | 1.86±0.07$^{i}$ |
| Relative weight of duodenum (%) | 1.02±0.03$^{c}$ | 1.21±0.05$^{a}$ | 0. 67±0.06$^{g}$ | 0.77±0.04$^{e}$ | 0.64±0.06$^{g}$ |
| Relative weight of jejunum (%) | 1.67±0.05$^{a}$ | 1.17±0.04$^{c}$ | 1.15±0.05$^{c}$ | 0.92±0.03$^{e}$ | 0.84±0.03$^{f}$ |
| Relative weight of ileum (%) | 1.56±0.05$^{a}$ | 1.17±0.03$^{c}$ | 1.05±0.03$^{d}$ | 0.66±0.01$^{f}$ | 0.60±0.03$^{g}$ |
| Relative weight of cecum (%) | 1.38±0.04$^{a}$ | 1.05±0.03$^{c}$ | 0.71±0.03$^{e}$ | 0.67±0.03$^{f}$ | 0.61±0.05$^{f}$ |

Table 15: Effects of different NE level on relative weight internal organs (female)

| Items | I group | II group | III group | IV group | V group |
|---|---|---|---|---|---|
| Live weight/g | 914.00±13.42$^{c}$ | 924.00±18.17$^{c}$ | 956.00±24.32$^{a}$ | 962.00±8.37$^{a}$ | 964.00±11.40$^{a}$ |
| Proventriculus weight /g | 4.14±0.21$^{e}$ | 4.06±1.81$^{e}$ | 4.36±0.38$^{c}$ | 4.08±0.15$^{e}$ | 4.60±0.16$^{a}$ |
| Gizzard weight g | 28.80±0.88$^{a}$ | 26.86±0.52$^{c}$ | 25.22±0.43$^{e}$ | 23.52±0.48$^{g}$ | 22.70±0.22$^{h}$ |
| Duodenum weight/g | 10.08±0.57$^{a}$ | 8.58±0.33$^{c}$ | 7.54±0.34$^{e}$ | 7.00±0.16$^{f}$ | 6.28±0.26$^{f}$ |
| Jejunumweight/g | 17.02±0.33$^{a}$ | 14.64±0.46$^{c}$ | 12.38±0.42$^{e}$ | 10.76±0.28$^{g}$ | 10.06±0.19$^{i}$ |
| Ileum weight/g | 11.56±0.27$^{a}$ | 10.46±0.32$^{c}$ | 10.10±0.60$^{c}$ | 8.72±0.28$^{e}$ | 7.04±0.27$^{g}$ |
| Cecum weight/g | 11.86±0.18$^{a}$ | 11.26±0.23$^{c}$ | 7.38±0.26$^{e}$ | 7.32±0.33$^{e}$ | 6.72±0.31$^{g}$ |
| Relative weight of proventriculus (%) | 0.45±0.03$^{cf}$ | 0.44±0.02$^{gf}$ | 0.52±0.02$^{a}$ | 0.42±0. 02$^{ef}$ | 0.48±0.02$^{c}$ |
| Elative weight of gizzard (%) | 3.15±0.13$^{a}$ | 2.91±0.06$^{c}$ | 2.64±0.05$^{e}$ | 2.45±0.06$^{e}$ | 2.34±0.04$^{g}$ |
| Relative weight of duodenum (%) | 1.10±0.06$^{a}$ | 0.93±0.04$^{c}$ | 0.79±0.02$^{e}$ | 0.73±0.04$^{ef}$ | 0.65±0.03$^{f}$ |
| Relative weight of jejunum (%) | 1.86±0.05a | 1.58±0.05c | 1.29±0.05e | 1.13±0.03g | 1.05±0.02i |
| Relative weight of ileum (%) | 1.27±0.03$^{a}$ | 1.13±0.02$^{c}$ | 1.05±0.04$^{d}$ | 0.91±0.03$^{e}$ | 0.73±0.06$^{f}$ |
| Relative weight of cecum (%) | 1.29±0.03$^{a}$ | 1.22±0.03$^{a}$ | 0.77±0.02$^{c}$ | 0.76±0.03$^{c}$ | 0.69±0.04$^{c}$ |

($p>0.05$); There were differences of stearic acid content in each group Content of polyunsaturated fatty acids and essential fatty acids in the pectoral muscle were lower than that in the leg muscle.

**Effects of different NE on relative weight internal organs of Saibei Silkies:** The results of different NE on relative weight internal organs of Saibei Silkies are showed in Table 14 and15.

Table 14 and 15 showed that gizzard weight, proventriculus weight, duodenum weight, jejunum weight, ileum weight, cecum weight, the relative weight of gizzard, the relative weight of duodenum, the relative weight of jejunum, the relative weight of ileum the relative weight of cecal in V group were very higher than that was in group ($p<0.01$), difference gradually were decreased when NE levels were decreased.

**Effects of different NE on intestinal length of Saibei Silkies:** The results of different NE on intestinal length of Saibei Silkies are showed in Table 16 and 17. Table 16 and 17 showed that the length of duodenum, jejunum, ileum, cecal in low energy group were significantly longer than which were in high-energy group ($p<0.01$), differences among each group were gradually decreased when NE levels were increased.

Table 16: Effects of different NE on intestinal length of growing chicken (male)

| Items | I group | II group | III group | IV group | V group |
|---|---|---|---|---|---|
| Duodenum length/cm | 22.52±0.54[c] | 24.30±0.48[a] | 21.98±0.33[c] | 18.1±0.36[e] | 18.38±0.48[e] |
| Jejunum length/cm | 55.10±0.98[a] | 48.64±0.42[c] | 49.22±1.61[c] | 45.40±0.58[e] | 45.36±0.44[e] |
| Ileum length/cm | 48.42±0.47[a] | 43.02±0.51[cd] | 45.80±0.37[b] | 35.48±0.46[f] | 41.36±3.89[d] |
| Cecum length/cm | 16.80±0.47[a] | 13.00±0.31[g] | 13.92±0.58[c] | 11.36±0.45[e] | 12.46±0.40[g] |

Table 17: Effects of different NE on intestinal length of growing chicken (female)

| Items | I group | II group | III group | IV group | V group |
|---|---|---|---|---|---|
| Duodenum length/cm | 24.28±1.13[a] | 23.98±0.40[a] | 24.82±0.75[a] | 21.34±0.55[c] | 21.34±0.48[c] |
| Jejunum length/cm | 57.24±1.27[a] | 47.76±2.73[c] | 46.12±1.22[c] | 42.52±0.56[e] | 42.48±0.53[e] |
| Ileum length/cm | 57.80±1.66[a] | 44.60±1.37[c] | 43.74±0.85[c] | 43.00±0.32[c] | 21.80±1.44[e] |
| Cecum length/cm | 16.54±0.36[a] | 15.86±0.55[b] | 15.06±0.26[c] | 13.36±0.47[e] | 12.92±0.40[e] |

## DISCUSSION

**Effects of dietary energy level on nitrogen metabolism:** Chen *et al*. (999) studied the impact of different dietary crude protein levels on the production performance, the amount of energy retention and nitrogen retention rate quality of Shiqi Yellow Chickens, the results showed that with increasing dietary crude protein concentration, body weight gain were significantly increased, feed conversion rate was extremely increased, nitrogen retention was significantly lowered when body weight gain was an indicator, the crude protein requirement of Shiqi Yellow Chicken was 19% and the suitable egg ratio was 15.1 g $MJ^{-1}$ during the early growth stage ;the suitable egg ratio was respectively 20.5% and 15.5 g $MJ^{-1}$. When feed conversion rate, the rate of nitrogen retention and energy retention rate were indicators. This study suggested that when NE was 11.51MJ $kg^{-1}$, nitrogen apparent metabolic rate of female was up to 56.08%, For male ,deposition of nitrogen was 3.2 9g $d^{-1}$ and the apparent metabolic rate was up to 49.31% when NE was 12.34 MJ $kg^{-1}$. From the nitrogen balance, they were positive balance. Saibei Silky female in group were most conducive to the development in the finishing period. Increasing dietary energy concentration can linearly decrease feed intake, improve energy intake but which did not affect the nitrogen ingested amount, the results as (Du, 2006; Pesti and Fletcher 1983) reported.

**Effects of dietary energy level on digestion and metabolism of energy:** Studies of Cao *et al*. (2008) on Duck showed that, body weight gain and feed conversion of the high energy level group were higher than the energy level group. The results of this study showed that effect of different energy levels of diets (10.38 and 10.94 MJ $kg^{-1}$ and 11.51 and 12.34 MJ $kg^{-1}$ and 12.96 MJ $kg^{-1}$) on ingestion of the total capacity of digestion and metabolism were significant ($p<0.05$ ). Chen *et al*. (1998) reported weight gain, feed consumption, feed consumption than the daily energy intake and protein feed intake of Shiqi chickens were significantly affected by different energy levels ($p<0.01$) with the energy levels being improved. weight gain were significantly increased, feed consumption ratio were significantly improved, feed consumption had downward trend, protein intake also was decreased with the energy being increased. Usually we considered that high-energy diets could significantly improve broiler weigh than low energy diets but place Taihe Silkies findings showed that chicken metabolic consumption of weight gain per gram and energy deposition rate of dietary was not significant (($p>0.05$) which related to growth patterns of different chicken breeds and different stages by comparison, the slow growth of chicken breeds were not sensitive enough to change reactions of dietary nutrient levels which had a wide range of adaptation[9].

The proportion of metabolism and total energy of female were respectively (9.83, 9.68, 9.83, 6.43 and 10.42%), an average of 9.24%, The proportion of metabolism and total energy of male were respectively (13.42, 12.18%, respectively, 11.74%, 12.15 and 13.84%) with an average of 12.66%. The metabolism and energy intake of male and female in group all were highest, differences with the other four groups were significant ($p<0.05$). In summary, starting from the view of the body energy and nitrogen utilization, we recommended that Saibei Silkies should be fed a high-energy high-protein or low-energy low-protein diet, should avoid the use of medium energy and the high ratio of energy and protein diet which was not conducive to the utilization of energy and nitrogen.

**Effects of NE on fat digestion and metabolism of growing chicken:** As can be seen from Table 7 and 8, the dry matter of female and male were decreased and feed intake were decreased when NE were increased, the decline of feed intake was more obvious with the higher energy which were significantly negative correlated with NE. when NE reached a certain amount, the metabolic rate of fat apparent were increased with NE being increased, this results proved Saibei Silky has the ability to take advantage of the high-energy diet. As (Chen *et al*., 1998) reported. The test further studies had shown that the apparent retention rate of fat and NE were positively correlated.

Mantha *et al*. (1999) studies in mice confirmed that intake of high-carbohydrate diets and High Fat diets

(HSF) were not only able to promote the body's energy intake but also be able to improve liver triglyceride content. As body fat synthetic substrate, lipids and carbohydrates in HSF promote the synthesis of fat and the fat in the diet had the lower loss in fat synthesis with respect to carbohydrate metabolism and thus was more conducive fat Synthesis (Flatt, 1988; Li and Yang, 2000) the study Hetian fowls in Fujian showed that Hetian chicken carcass were increased with dietary energy concentration being increased, the fat percentage of chicken abdominal also was increased, unsaturated fatty acids and essential fatty acids content were increased but the morphology of the muscle fibers and muscle fiber activity and the number of proteolytic enzymes and carcass quality were affected when the growth rate was too fast.

**Effects of NE on slaughter Performance of growing chicken:** The slaughtering performance of poultry is mainly influenced by genetic factors, there is no significant impact of energy and protein in the diets on the slaughter performance of poultry in most cases, studies of nutrition levels on the slaughter performance were more, (Yang and Li, 2001) found in AA broilers as a research object, the rate of slaughtered, eviscerated yield, leg muscle rate, brisket rate high-energy in high-protein group slightly higher than the low-energy low-protein group; but which did not reach a significant level. Jiang *et al*. (2004) studied the impact of energy and protein levels on carcass quality of Hunan yellow chicken, there was a increased tendency of slaughter performance when chickens were fed low-energy (10.59 MJ $kg^{-1}$)and low protein (14%) . The test in different energy diet at the same protein level, dressing percentage and eviscerated yield of low-energy group were higher, the pilot with Jiang Guitao etc. were basically consistent, there were some differences with Libin Yang which may be strain differences reasons. With the improvement of the energy levels may be appropriate to improve the rate of breast muscle of Saibei Silkies and the leg muscle rate of male, no significant effect on leg muscle rate of female, when the protein level was constant, thoracic leg muscle rate of Saibei Silky was not obviously effected by changes of NE within a certain range The high energy level of the diet had greater impact on carcass weight, high energy level of the diet can increase the carcass weight of female and male indicating that there were bigger effect of NE on fat accumulation. As Becker *et al*.(1979), Cabel and Waldroup (1991) reported Analyzed above: the high energy level of the diet is sufficient to increase the slaughter rate, half-the eviscerated rate, muscle rate which also provided a foundation to improve economic efficiency.

**Effects of NE on muscle protein, muscle fat of growing chicken:** Protein content of chicken is one of the important indicators which measure the nutritional value of meat, the higher the protein content, the higher the nutritional value of chicken. The high energy level of the diet helps to reduce deposition of abdominal fat of male, to raise abdominal fat deposition of female. Under the conditions of the test, the leg muscles crude protein content of male and female were significantly increased by the high-energy diet. This showed that the high energy level of the diet can improve the nutritional value of chicken in line with the public for the pursuit of quality chicken.

**Effects of NE on Fatty Acids of growing chicken:** Tests showed that the different sources of fatty acids being fed to a broiler can change a fatty acid composition in the body of the; Fatty acids include saturated fatty acids and unsaturated fatty acids, unsaturated fatty acids according to the double bond position and multi-function has important biological functions for the ω-6 series and ω-3 series and the omega-6 series are mainly Linoleic Acid (LA) and Arachidonic Acid (AA), omega-3 series are α-Linolenic Acid (ALA), Eicosa Pentaenoic Acid (EPA) and Docosa Hexaenoic Acid (DHA). Essential fatty acids have a very good health care which are very effective for the prevention of cardiovascular disease and are necessary for human growth and development of the brain tissue substances (Connor *et al*, 1992) .

The relative content analysis of muscle fatty acid showed unsaturated fatty acids of Saibei Silkies were significantly higher than the saturated fatty acids, this result with the physical properties that the chicken fat generally exhibit the semi-solid is fairly consistent, under normal circumstances, the body of the unsaturated fatty acids can be fat Semi-solid and liquid-like. Unsaturated fatty acids were significantly higher than saturated fatty acids which is a resources advantage of Saibei Silkies. In fact, people traditionally spoke highly of meat taste of Saibei Silkies, the measurement results were exactly favorable support this view. Polyunsaturated Fatty Acids (PUFA) have important physiological functions of regulating lipid metabolism of the human body, preventing and treating of cardiovascular diseases, being anticancer, fighting obesity, promoting growth and development. PUFA are able to regulate fat distribution, to stimulate the utilization of fat oxidation, thereby reducing the level of body fat. PUFA are inhibitors of poultry Fatty Acid Synthase (FAS), the impact of PUFA on FAS through directly regulating of biochemical processes in cell nucleus and reducing fat level in the animal body, PUFA can influence leptin which regulate of feeding fat oxidation glucose absorption, thus possible to reduce the excessive growth of the fat. DHA and EPA in PUFA can inhibit the synthesis of cholesterol in the body, can increase cholesterol excretion, can change the fatty acid composition of lipoproteins, thereby increasing its liquidity. PUFA can improve hyperlipidemia, prevention of atherosclerosis in order to prevent high blood pressure. In the test, the content of PUFA and Essential Fatty Acids (EFA) of chest and leg muscle in group and group were higher than the Taihe Wuji (Tian *et al*., 2007) which showed that a good quality of Saibei Silky muscles could provide and meet the needs of essential fatty acids in people's daily dietary, to improve the proportion balance of polyunsaturated fatty acid in the body, thereby increasing the level of human health. It was worth mentioning that this test found that with increasing energy, the unsaturated fatty acids had a significantly higher trend, I believed that the likely energy decided unsaturated fatty acids loci on the existence of a gene effect which has a important theoretical significance for the further development and utilization of Saibei Silkies and for discovering quality Silky best energy ratio.

**Effects of NE on internal organs relative weight and small intestine length:** For chickens, digestive tract is an important place of nutrient digestion and absorption, digestive organs are metabolic basis of animal life activities "facilities", the material basis of its physiological functions, whose dynamic the fast and slow growth determining the good or bad developments of animals. Poultry the digestive tract length quality of the poultry related to the poultry age, size and the food feed type.

In the test with NE being increased, digestive quality and the length of each segment of the gut were decreased. This showed long-term feeding of high NE diet could slow the gastrointestinal development of chickens, especially the length of small intestine and gizzard weight. NE affects the development of the gastrointestinal tract of the poultry, the poultry has a strong ability to adjust its own energy requirements by reducing feed intake, thus slowing the development of the digestive tract. Meanwhile, digestion and absorption under physiological conditions in such a high energy level, the body appears compensatory physiological response, reducing the weight and peristalsis of the digestive organs.

## CONCLUSION

There were some effects of different energy levels on the growth and development, the metabolism of nutrients of growing Saibei Silkies. Saibei Silkies had a good ability to take advantage of the high-energy diets, fat metabolism of female was the highest when NE was 12.96 MJ $kg^{-1}$. However, from the view of the nitrogen balance, positive equilibrium of female was the largest when NE was 11.51MJ $kg^{-1}$ which was more conducive to the growth and development of the Saibei Silkies female, the energy level was the most appropriate.

There were some effects of different energy levels on carcass weight, dressing percentage and eviscerated rate of growing Saibei Silkyies. The diet of higher energy level could increase carcass weight of female and male; low-energy diets might be appropriate to increase the slaughter rate and eviscerated yield; certain protein levels, appropriate energy level changes within a certain range Saibei Silky thoracic leg muscle rate impact is not obvious, high-energy diet can improve public hen breast muscle rate and the rooster's leg muscle rate, no significant effect on hen's leg muscle rate.when the protein level was constant, thoracic leg muscle rate of Saibei Silky was not obviously effected by changes of NE within a certain range.

There were bigger effect of different energy levels on the development of the digestive tract of growing Saibei Silkyies, low-energy diets were conducive to the development of the poultry digestive tract, high-energy diets could slow the development of the digestive tract, NE could significantly affect the length of the small intestine and the weight of the muscle stomach. Therefore, according to the characteristics of growth and development of growing Saibei Silkies, both to meet the growth and development but also does not affect the meat under the premise, to lay the foundation for future egg production, we may be appropriate to reduce the level of dietary energy.

In this experiment, high-energy diets improve the crude protein of leg muscle and PUFA of female and male The test showed that the high energy level was possible to improve the nutritional value of chicken which could diets rich in PUFA and a preferred fatty acid ratio of the precious food.

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