Introduction

Flaxseed (*Linum usitatissimum* L.) is an excellent source of n-3 polyunsaturated fatty acids (PUFA) and recently there has been increasing interest in enhancing n-3 PUFA in the human diet for heart health and potential chemo-protective purposes (Huang and Milles, 1996; Huang and Ziboh, 2001). Health-conscious consumers have raised the demand for PUFA-enriched meats and numerous studies have been undertaken to increase the PUFA level in meat through dietary supplementation.

The dietary use of flaxseed has been proposed by many authors to obtain meat with raised n-3 PUFA in beef cattle (Scollan et al., 2001; Raes et al., 2004), in pigs (Enser et al., 2000; Riley et al., 2000; Matthews et al., 2000) and in chickens (Rymer and Givens, 2005; Shen et al., 2005). The possibility of improving the n-3 PUFA proportion and decreasing the n-6/n-3 ratio of rabbit meat by dietary supplementation has important implications and the inclusion of flaxseed in diets has successfully been attempted in rabbits (Bernardini et al., 1999; Cavani et al., 2003; Dal Bosco et al., 2004; Colini et al., 2005; Bianchi et al., 2006, 2009; Kouba et al., 2008). Tres et al. (2008, 2009) have investigated the effect of various dietary ratios of flaxseed oil and sunflower oil additions on litter growth and health, fattening performance and carcass traits. A commercially available golden variety of flaxseed (GFS) was used in this study. This variety was developed for human consumption and it is extensively consumed by humans that brown flaxseed is generally only considered as an animal feed. GFS can be given to rabbits at levels of up to 16% in the diet without any adverse effects on growth performance and with a better digestibility than the control diet (Peiretti and Meineri, 2008a). Rodriguez et al. (2001) have evaluated nutrient digestibility and the metabolisable energy of diets with graded concentrations of GFS fed to growing broiler chickens. Ortiz et al. (2001) have evaluated the metabolisable energy and digestibility of crude fat and single fatty acid of GFS in growing broiler chickens. No information is available on the effects of diets with increasing levels of GFS on meat quality and lipid traits of growing rabbits.

The present work was designed to study GFS as a dietary source of n-3 PUFA for the production of healthy rabbit meat and its effect on the carcass characteristics, meat composition and fatty acid (FA) profile of the meat and perirenal fat.
Measured traits
At the end of the experimental period, all the rabbits from each group were weighed and slaughtered without fasting. The carcasses were prepared by removing the skin, feet, paws, genital organs, urinary bladder and digestive tract, as recommended by Blasco et al. (1993). The carcass was weighed and the weights of the skin and limbs, head, liver, kidneys, heart and lungs were recorded and expressed as a percentage of slaughter weight (SW). The forelegs, hind legs, breast and ribs, loin and abdominal wall were weighed. Their weights were expressed as a percentage of commercial carcass weight (CCW).

The *longissimus dorsi* muscle and perirenal fat samples were collected 24 h post-mortem from the carcass and immediately frozen at -20°C until analysed.

Analytical determinations
The proximate composition of the GFS, diets and meat were determined according to the AOAC procedures (AOAC, 2000). The meat and diet samples were analysed to determine dry matter, total N content, ash by ignition to 550°C and ether extract (EE) using the Soxhlet method. The diet samples were also analysed to determine neutral detergent fibre (NDF) without sodium sulfite or *C* amylose, and acid detergent fibre (ADF), as described by Robertson and Van Soest (1981), and gross energy (GE) by means of an adiabatic bomb calorimeter (IKA C7000, Staufen, Germany). Lipid extraction was performed on the GFS, the diets and the meat and fat samples according to Hara and Radin (1978), while the transesterification of the FAs was carried out according to Christie (1982), with the modifications described by Chouinard et al. (1999). The FAs were analysed as their methyl esters. The analysis was carried out by gas chromatography, as reported by Peiretti et al. (2007). The sati uration (S/P), atherogenic (AI) and thrombogenic (TI) indexes were calculated according to Ulbricht and Southgate (1991) as follows:

\[
S/P = (C12:0 + C14:0 + C16:0)/[0.5 \times (C14:0 + C16:0)]/\Sigma \text{MUFA} + \Sigma \text{n-6} + \Sigma (n-3)
\]

\[
AI = (C12:0 + 4 \times C14:0 + C16:0)/\Sigma \text{MUFA} + \Sigma \text{n-6} + \Sigma (n-3)
\]

\[
TI = (C14:0 + C16:0 + C18:0)/[0.5 \times \Sigma \text{MUFA} + 0.5 \times \Sigma (n-6) + 3 \times \Sigma (n-3) + \Sigma (n-5) + \Sigma (n-6)]
\]

where MUFA and PUFA are monounsaturated FAs and polyunsaturated FAs, respectively.

Statistical analyses
The statistical analyses were performed using the SPSS software package (version 11.5.1 for Windows, SPSS Inc., USA). An analysis of variance was used to evaluate the effects of different concentrations of GFS on the performance, carcass characteristics, meat composition and FA profile of the meat and fat of the rabbits. The differences were tested using Duncan’s multiple range test. The LNA and LA proportions of the feed and muscles pertaining to the present and other works were also subjected to regression analysis using linear models.

### Results and discussion

**Productive performances, carcass traits and meat quality**

No rabbit died during the trial. The weight gain and food intake did not differ significantly (P>0.05) between the dietary treatments (Table 2). These results are in agreement with others who have not observed any detrimental effect of whole flaxseed on the productive performance of rabbits (Bernardini et al., 1999; Dal Bosco et al., 2004; Bianchi et al., 2009). No sig-

### Table 1. Ingredients and composition of the experimental diets.

| Ingredients                        | 0   | 8   | 16  |
|------------------------------------|-----|-----|-----|
| Dehydrated alfalfa meal, %         | 46  | 44  | 42  |
| Corn, %                           | 15  | 17  | 17  |
| Barley, %                         | 19  | 15  | 14.5|
| Soybean meal, %                   | 12  | 10  | 6.5 |
| Palm oil, %                       | 4   | 2   | 0   |
| Golden flaxseed, %                | 0   | 8   | 16  |
| Lignosulphite, %                  | 2   | 2   | 2   |
| Vitamin-mineral premix, %         | 2   | 2   | 2   |

### Chemical composition

- **Dry matter, %**  
  - 90.4  
  - 91.1  
  - 91.7
- **Organic matter, % DM**  
  - 92.2  
  - 91.8  
  - 92.2
- **Crude protein, % DM**  
  - 18.9  
  - 19.1  
  - 18.4
- **Ether extract, % DM**  
  - 5.3  
  - 7.3  
  - 9.7
- **Ash, % DM**  
  - 7.8  
  - 8.2  
  - 7.8

**Neutral detergent fibre, % DM**

- 28.5  
- 29.6  
- 28.4

**Acid detergent fibre, % DM**

- 17.2  
- 16.8  
- 17.0

**Acid detergent lignin, % DM**

- 3.1  
- 3.0  
- 4.4

**Gross energy, MJ/kg DM**

- 18.6  
- 19.0  
- 19.7

**Digestible energy, MJ/kg DM**

- 12.1  
- 12.2  
- 12.2

*Proximate composition: moisture 6.7%, crude protein 23.5%, crude fibre 17.1%, ether extract 36.9%, ash 3.4%, nitrogen free extract 19.1%, gross energy 27.0 MJ/kg DM. Per kg diet: Vit. A 2000 UI; tocopherol acetate 16 mg; Niacine 60 mg; Fe 16 mg; Cu 0.6 mg; Mg 0.46 mg; Mn 0.02 mg; Zn 0.2 mg; Ca 0.03 mg; P 0.2 mg; Na 0.01 mg; K 0.02 mg; S 0.01 mg. The digestible energy content of the diets was calculated according to the regression proposed by Fernández-Carmona et al. (1996).

### Table 2. Carcass yield and proportions (means ± SE) of various carcass parts and organs of rabbits fed three levels of golden flaxseed.

|        | Golden flaxseed, % of diet |
|--------|-----------------------------|
|        | 0   | 8   | 16  |
| Initial weight, g                      | 2091±42 | 2095±45 | 2035±52 |
| Slaughter weight (SW), g               | 2393±80 | 2397±87 | 2391±57 |
| Commercial carcass weight (CCW), g     | 1719±62 | 1746±56 | 1733±51 |
| Carcass yield, %                       | 58.4±0.91 | 59.2±0.38 | 59.9±0.70 |
| Head, % SW                             | 5.76±0.12 | 5.87±0.13 | 5.91±0.11 |
| Liver, % SW                            | 3.56±0.33 | 3.40±0.19 | 3.55±0.20 |
| Kidneys, % SW                          | 0.60±0.02 | 0.59±0.03 | 0.58±0.01 |
| Heart, lung, etc., % SW                | 0.75±0.05 | 0.89±0.02 | 0.99±0.06 |
| Skin and limbs, % SW                   | 17.8±0.51 | 17.5±0.43 | 17.7±0.40 |
| Hind legs, % CCW                       | 27.2±0.54 | 27.1±0.32 | 27.0±0.25 |
| Forelegs, % CCW                        | 13.2±0.23 | 13.1±0.19 | 12.8±0.36 |
| Breast and ribs, % CCW                 | 20.5±0.36 | 21.4±0.60 | 20.4±0.71 |
| Loin and abdominal wall, % CCW         | 20.8±0.51 | 20.1±0.50 | 21.2±0.68 |
ificant effects of diets with different dietary ratios of flaxseed and sunflower oils were found on the litter or doe performances and the body weight of the fattening rabbits was unaffected up to 77 days (Eiben et al., 2010). This finding coincides with that of Maertens et al. (2005), who reported beneficial effects of flaxseed on the performance, milk composition and viability of the progeny in rabbit does. Similarly, growth was unaffected when the rabbits were fed a 3% flaxseed oil or a 3% sunflower oil diet from 17 to 44 days of age (Casado et al., 2006).

Previous studies pointed out a decrease in the growth rate of rabbits fed diets containing flaxseed oil (Verdelhan et al., 2005), extruded flaxseed (Colin et al., 2005) or whole flaxseed (Bianchi et al., 2006). Some authors associated the poorer growth rate to the presence of toxic substances in raw whole flaxseed, which may depress energy utilization. A correct pelleting procedure may have a good effect on reducing the anti-nutritional factor content, as reported by Shen et al. (2005), who found a satisfactory growth performance in broilers fed diets containing 12% of pellet-processed flaxseed.

The inclusion of GFS in the diets did not significantly influence the carcass yield or the proportions of the various carcass parts and organs of the rabbits (Table 2).

The chemical composition of the longissimus dorsi muscle was not affected by the diets with increasing levels of GFS (Table 3). This finding coincides with that of Kouba et al. (2008), who reported that an n-3 PUFA rich diet with 3% extruded flaxseed did not have any effect on the dry matter, protein or lipids of the rabbit muscles. Similarly, the chemical composition of the longissimus dorsi muscle was unaffected when rabbits were fed an 8% flaxseed diet (Dal Bosco et al., 2004).

### Fatty acid profile of the diet, meat and perirenal fat

The FA profile of the golden variety of flaxseed and the three diets is reported in Table 4. The FA component of the GFS was α-linolenic acid (LNA, C18:3 n-3) (58%) and its value similar to those reported in literature for the brown variety (Ortiz et al., 2001; Rodriguez et al., 2001; Bean and Leeson, 2002). GFS also presented a good percentage of linoleic acid (LA, C18:2 n-6) and oleic acid (OA, C18:1 n-9). As far as the FA profile of the diets is concerned, there was an increase in LNA and a decrease in palmitic acid (PA, C16:0), OA and LA with increasing GFS content of the diets. Conversely, the LA proportion of these tissues did not significantly differ between the groups.

The significant increase in LNA and the relatively constant trend of LA in the meat of rabbits fed diets rich in LNA and LA is in agreement with the results of Dal Bosco et al. (2004), Peiretti et al. (2007), Kouba et al. (2008) and Peiretti and Meineri (2008a) (Figures 1 and 2, respectively). The relationship between the

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Table 3. Chemical composition (on a dry matter basis; means±SE) of the longissimus dorsi muscle of rabbits (n=30; age=14 weeks) fed three levels of golden flaxseed after 1 d of storage at 4°C.

| Golden flaxseed, % of diet | 0     | 8     | 16    |
|----------------------------|-------|-------|-------|
| Dry matter, %              | 25.4±0.3 | 25.8±0.3 | 25.3±0.2 |
| Protein, %                 | 91.8±0.3 | 90.6±0.5 | 90.3±0.6 |
| Ash, %                     | 5.2±0.1 | 5.3±0.1 | 5.3±0.1 |
| Ether extract, %           | 2.5±0.2 | 2.6±0.3 | 2.9±0.2 |

Table 4. Fatty acid profile (% of total FA) of the golden flaxseed and the diets.

| GFS | Golden flaxseed, % of diet | 0     | 8     | 16    |
|-----|----------------------------|-------|-------|-------|
| C12:0 | 0.0 | 0.1 | 0.0 | 0.0 |
| C14:0 | 0.0 | 0.5 | 0.3 | 0.1 |
| C16:0 | 4.6 | 29.1 | 15.7 | 8.3 |
| C18:0 | 3.3 | 3.9 | 3.5 | 3.3 |
| C18:1n-9 | 15.7 | 30.0 | 23.0 | 18.4 |
| C18:2n-6 | 0.7 | 0.6 | 0.6 | 0.7 |
| C18:3n-3 | 15.9 | 23.5 | 21.7 | 20.6 |
| C20:1n-9 | 58.3 | 7.6 | 32.9 | 46.9 |
| C20:0 | 0.0 | 0.3 | 0.2 | 0.1 |
| C20:1n-9 | 0.0 | 0.2 | 0.2 | 0.2 |
| Unidentified | 1.4 | 4.0 | 1.7 | 1.4 |

Table 5. Fatty acid (FA) profile (% of total FA; means±SE) of the longissimus dorsi muscle of rabbits (n=30; age=14 weeks) fed three levels of golden flaxseed.

| Golden flaxseed, % of diet | 0     | 8     | 16    |
|----------------------------|-------|-------|-------|
| C14:0 | 2.16±0.14<sup>a</sup> | 1.85±0.09<sup>a</sup> | 1.52±0.10<sup>b</sup> |
| C14:1 | 0.29±0.05<sup>a</sup> | 0.14±0.003<sup>b</sup> | 0.06±0.03<sup>b</sup> |
| C15:0 | 0.46±0.02<sup>a</sup> | 0.46±0.01<sup>a</sup> | 0.41±0.01<sup>b</sup> |
| C16:0 | 26.23±0.37<sup>b</sup> | 23.47±0.34<sup>b</sup> | 19.73±0.51<sup>c</sup> |
| C16:1 | 3.51±0.54<sup>b</sup> | 2.67±0.30<sup>b</sup> | 1.89±0.25<sup>c</sup> |
| C17:0 | 0.25±0.05<sup>a</sup> | 0.45±0.003<sup>b</sup> | 0.45±0.01<sup>b</sup> |
| C18:0 | 5.84±0.21<sup>a</sup> | 5.52±0.16<sup>a</sup> | 5.22±0.16<sup>a</sup> |
| C18:1n-9 | 27.06±0.53<sup>a</sup> | 23.80±0.33<sup>b</sup> | 21.43±0.28<sup>b</sup> |
| C18:1n-7 | 1.10±0.05<sup>a</sup> | 1.03±0.04<sup>b</sup> | 0.97±0.03<sup>b</sup> |
| C18:2n-6 | 20.01±0.70<sup>a</sup> | 20.02±0.31<sup>b</sup> | 20.24±0.28<sup>b</sup> |
| C18:3n-3 | 0.22±0.02<sup>a</sup> | 0.19±0.02<sup>b</sup> | 0.15±0.01<sup>b</sup> |
| C18:3n-2 | 4.65±0.21<sup>a</sup> | 12.35±0.66<sup>b</sup> | 20.08±0.91<sup>c</sup> |
| C20:1n-9 | 0.22±0.01<sup>a</sup> | 0.18±0.01<sup>b</sup> | 0.16±0.01<sup>b</sup> |
| C20:3n-3 | 0.25±0.03 | 0.24±0.04 | 0.18±0.01 |
| C20:4n-6 | 2.06±0.24 | 2.32±0.27 | 2.05±0.21 |
| Unidentified | 5.74±0.48 | 5.34±0.48 | 5.44±0.63 |

<sup>a,b</sup>Means in the same row with different superscripts differ (P<0.05).
LNA proportion of the diet and the LNA proportion in the rabbit meat was evidenced by the linear regressions found in the *longissimus dorsi* muscle (LNA=0.534 x feed LNA-0.9994; $R^2=0.84$). Viceversa, the LA proportion of this muscle did not change with increasing levels of LA in the diet (Figure 2). This trend is partially confirmed when LNA and LA concentrations on fat basis of feed and muscle were regressed as reported in Figures 3 and 4, respectively, even if the relationship between the LNA concentration of the diet and the LNA concentration in the rabbit meat was less predictive ($R^2=0.71$). The effectiveness of whole flaxseed in increasing the LNA and n-3 PUFA contents of the meat was previously reported in several studies on rabbits (Bernardini et al., 1999; Dal Bosco et al., 2004; Bianchi et al., 2006; Maertens et al., 2008). Bianchi et al. (2009) found a close relationship ($R^2=0.99$) between the LNA content in rabbit meat and the whole flaxseed content in the diet, but the LNA proportion found in this experiment in the *longissimus dorsi* muscle of rabbit fed GFS supplemented diet was lower than that found in the work at the same flaxseed inclusion level. Another close relationship ($R^2=0.94$) between the n-3 PUFA feed level and the rabbit meat composition was found by Colin et al. (2005).

In Tables 7 and 8 are also reported saturated fatty acid (SFA), MUFA and PUFA, n-6 PUFA, n-3 PUFA, n-6/n-3 ratios, saturation (S/P), atherogenic (AI) and thrombogenic (TI) indexes for the *longissimus dorsi* muscle and for perirenal fat. These parameters are commonly used criteria to describe the dietetic value of tissues. The PUFA proportion and, in particular, the n-3 PUFA proportion of these tissues increased with increasing levels of GFS inclusion. Conversely, a decrease was found for the SFA and MUFA proportions with an increasing level of GFS inclusion. These results agree with the findings of some authors (Dal Bosco et al., 2004; Peiretti et al., 2007; Peiretti and Meineri, 2008b) who fed oilseed rich in LNA to rabbits.

The n-6/n-3 PUFA ratio of the rabbit meat decreased from 4.58 and 3.35 in the meat and perirenal fat of rabbits fed the control diet, to 1.13 and 0.79 in the meat and perirenal fat of rabbits fed the 16% GFS diet. However, the n-6/n-3 ratio in the rabbit meat was usually higher than 5, due to the high LNA content of traditional diets, and reached 7 in the loin (Dal Bosco et al., 2004) and 11-11.6 in the hind leg meat (Dalle Zotte, 2002). Similarly, Kouba et al. (2008) found that flaxseed, when fed to rabbits, significantly increased the PUFA content and lowered the n-6/n-3 ratios, SFA and MUFA contents of the *longissimus dorsi* muscle and perirenal fat compared to the control diet. Several studies have highlighted that flaxseed enriched diets generally increase the unsaturation of depot lipids (Bianchi et al., 2006, 2009) and reduce their n-6/n-3 ratio (Dal Bosco et al., 2004; Colin et al., 2005; Maertens et al., 2008).

The n-6/n-3 ratio found in the rabbit meat and fat of the control group of the present study was higher than GFS diets, but lower than those found in commercial diets for rabbit and this was mainly due to the high level of incorporation of alfalfa (more than 40%), which increased the amount of LNA in the diet and consequently in the rabbit tissues.

The saturation, atherogenic and thrombogenic indexes showed significant variations, and a decrease with an increasing GFS inclusion level was found for all these indexes.

### Table 6. Fatty acid (FA) profile (% of total FA; means±SE) of the perirenal fat of rabbits (n=30; age=14 weeks) fed three levels of golden flaxseed.

| Golden flaxseed, % of diet | 0     | 8      | 16     |
|---------------------------|-------|--------|--------|
| C12:0                     | 0.11±0.03 | 0.09±0.03 | 0.11±0.03 |
| C14:0                     | 0.15±0.03 | 0.14±0.03 | 0.14±0.03 |
| C14:1                     | 1.94±0.12a | 1.54±0.05b | 1.33±0.07b |
| C15:0                     | 0.19±0.05a | 0.10±0.03ab | 0.04±0.02c |
| C15:5                     | 0.50±0.03a | 0.42±0.02c | 0.40±0.01c |
| C16:0                     | 2.99±0.50a | 2.02±0.23c | 1.18±0.14c |
| C17:0                     | 0.55±0.03a | 0.56±0.05c | 0.44±0.01c |
| C18:0                     | 6.38±0.22a | 5.43±0.13c | 5.20±0.11c |
| C18:1 n-9                 | 28.00±0.42a | 24.03±0.24c | 20.44±0.26c |
| C18:1 n-7                 | 0.96±0.10a | 0.64±0.02c | 0.82±0.02c |
| C18:1 n-9                 | 21.62±0.51a | 21.50±0.42c | 21.69±0.46c |
| C18:1 n-9                 | 0.17±0.01a | 0.17±0.01c | 0.14±0.01c |
| C18:3 n-3                 | 6.68±0.18a | 19.33±0.33b | 28.37±1.22a |
| C20:0                     | 0.15±0.01a | 0.06±0.02c | 0.11±0.01c |
| C20:1 n-9                 | 0.25±0.01a | 0.25±0.02c | 0.17±0.01c |
| Unidentified              | 2.48±0.15a | 3.77±0.36c | 2.59±0.14c |

$^{a,b}$Means in the same row with different superscripts differ (P<0.05).

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**Figure 1.** Proportions of α-linolenic acid in feeds plotted against the linolenic acid level of the *longissimus dorsi* muscle of rabbits. Regression line, muscle linolenic acid =0.534 x feed linolenic acid -0.9994 ($R^2=0.84$).

**Figure 2.** Proportions of linoleic acid in feeds plotted against the linoleic acid value of the *longissimus dorsi* muscle of rabbits.
(Tables 7 and 8). The S/P ratio was higher in the meat and perirenal fat of the rabbits fed the control diet (0.58 and 0.59, respectively) and lower in the meat and perirenal fat of the rabbits fed 16% of GFS (0.39 and 0.33, respectively). A decreasing trend of the atherogenic and thrombogenic indexes of the muscle and perirenal fat was observed in the same experiments there was and their values were similar to those found in the present study.

Conclusions

The dietary use of the golden variety of flaxseed in growing rabbits can be exploited with the aim of producing rabbit meat with a higher LNA proportion. The results of this experiment have demonstrated that the nutritional value of rabbit meat can be improved by increasing its LNA proportion by up to three and four times through the use of diets containing 8% and 16% GFS, while all the indexes related to nutritional quality improve when their values are halved. However, the impact of n-3 PUFA enrichment of rabbit meat on its oxidative stability still needs to be evaluated by feeding animal with supranutritional levels of an antioxidant with the aim of improving meat shelf-life.

In conclusion, there is not much difference between brown flaxseed and GFS, but some specific advantages of using the GFS than brown flaxseed, normally used for animal feed, exist. The demand for organic products grows every-day and GFS is so readily available in certified organic form and it could be used in organic rabbitry; however it is necessary to assess the commercial applicability, considering its greater cost.

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Table 7. Fatty acid composition (% of total FA; means±SE) and indexes related to human health in the perirenal fat of rabbits (n=30; age=14 weeks) fed three levels of golden flaxseed.

| Golden flaxseed, % of diet | 0     | 8     | 16    |
|---------------------------|-------|-------|-------|
| SFA                       | 34.94±0.36<sup>c</sup> | 31.75±0.39<sup>b</sup> | 27.53±0.55<sup>c</sup> |
| MUFA                      | 32.11±1.04<sup>d</sup> | 27.61±0.63<sup>b</sup> | 24.53±0.51<sup>c</sup> |
| PUFA                      | 27.20±0.88<sup>ab</sup> | 35.12±0.45<sup>b</sup> | 42.70±0.80<sup>c</sup> |
| PUFA n-3                  | 4.91±1.19<sup>a</sup>  | 12.59±0.63<sup>b</sup> | 20.55±0.91<sup>c</sup> |
| PUFA n-6                  | 22.29±0.78<sup>a</sup> | 22.53±0.53<sup>b</sup> | 22.45±0.36<sup>c</sup> |
| n-6/n-3                   | 1.48±0.19<sup>a</sup>  | 1.85±0.15<sup>b</sup>  | 1.13±0.07<sup>c</sup>  |
| S/P                       | 0.58±0.01<sup>a</sup>  | 0.49±0.01<sup>b</sup>  | 0.39±0.01<sup>c</sup>  |
| Atherogenic index         | 0.59±0.02<sup>a</sup>  | 0.49±0.01<sup>b</sup>  | 0.38±0.01<sup>c</sup>  |
| Thrombogenic index        | 0.81±0.02<sup>a</sup>  | 0.49±0.01<sup>b</sup>  | 0.31±0.01<sup>c</sup>  |

<sup>a,b,c</sup>Means in the same row with different superscripts differ (P<0.05); SFA, saturated fatty acid; MUFA, monounsaturated fatty acid; PUFA, polyunsaturated fatty acid; PUFA n-3, polyunsaturated fatty acid series n-3; PUFA n-6, polyunsaturated fatty acid series n-6; n-6/n-3, PUFA n-6/PUFA n-3 ratio; S/P, saturated fatty acid/unsaturated fatty acid.

Table 8. Fatty acid composition (% of total FA; means±SE) and indexes related to human health in the perirenal fat of rabbits (n=30; age=14 weeks) fed three levels of golden flaxseed.

| Golden flaxseed, % of diet | 0     | 8     | 16    |
|---------------------------|-------|-------|-------|
| SFA                       | 34.94±0.36<sup>c</sup> | 31.75±0.39<sup>b</sup> | 27.53±0.55<sup>c</sup> |
| MUFA                      | 32.11±1.04<sup>d</sup> | 27.61±0.63<sup>b</sup> | 24.53±0.51<sup>c</sup> |
| PUFA                      | 27.20±0.88<sup>ab</sup> | 35.12±0.45<sup>b</sup> | 42.70±0.80<sup>c</sup> |
| PUFA n-3                  | 4.91±1.19<sup>a</sup>  | 12.59±0.63<sup>b</sup> | 20.55±0.91<sup>c</sup> |
| PUFA n-6                  | 22.29±0.78<sup>a</sup> | 22.53±0.53<sup>b</sup> | 22.45±0.36<sup>c</sup> |
| n-6/n-3                   | 1.48±0.19<sup>a</sup>  | 1.85±0.15<sup>b</sup>  | 1.13±0.07<sup>c</sup>  |
| S/P                       | 0.58±0.01<sup>a</sup>  | 0.49±0.01<sup>b</sup>  | 0.39±0.01<sup>c</sup>  |
| Atherogenic index         | 0.59±0.02<sup>a</sup>  | 0.49±0.01<sup>b</sup>  | 0.38±0.01<sup>c</sup>  |
| Thrombogenic index        | 0.81±0.02<sup>a</sup>  | 0.49±0.01<sup>b</sup>  | 0.31±0.01<sup>c</sup>  |

<sup>a,b,c</sup>Means in the same row with different superscripts differ (P<0.05); SFA, saturated fatty acid; MUFA, monounsaturated fatty acid; PUFA, polyunsaturated fatty acid; PUFA n-3, polyunsaturated fatty acid series n-3; PUFA n-6, polyunsaturated fatty acid series n-6; n-6/n-3, PUFA n-6/PUFA n-3 ratio; S/P, saturated fatty acid/unsaturated fatty acid.
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