

## MEALWORM AS A VALUABLE SOURCE OF ESSENTIAL FATTY ACIDS IN ANIMAL FEED PRODUCTION

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### INTRODUCTION

To meet the need for meat intake due to the growth of the human population, the demand and research on alternative protein sources is of the great importance. In the last eight years, the price of protein sources for animal feed production has doubled and already represents 60-70% of the total cost. Insects present valuable source of proteins, fat and minerals therefore one of the possible solution could be application of insect meal in feed production. Although that insects are already recognized as novel protein food, it is important to emphasize that most of edible insects are rich in fat content also. The average fat content ranges from 13 to over 33% depending on the rearing conditions. Moreover some insect species are rich in essential fatty acid and further research on the influence of rearing condition on insect meal fatty acid profile are very desirable. The main goal of this research was to enrich the fatty acid profile of *Tenebrio molitor* by changing rearing condition. Different rearing conditions in terms of feed have been chosen to enrich essential fatty acids.

### MATERIAL AND METHODS

Larvae of *Tenebrio molitor* were reared in plastic boxes. Every box contained wheat bran as a base diet and every third day larvae were fed with carrots (diet 1), or cabbage (diet 2) or mix of carrot, cabbage and flax seed (diet 3). Afterwards in order to produce mealworm, larvae were collected and inactivated in boiling water, dried and milled. Insect oil was obtained by extraction with 2:1 chloroform-methanol mixture. Fatty acid methyl esters (FAMES) were then determined using an Agilent GC equipped with a flame ionization detector (FID) (Agilent, 7890 Series, USA) and SP-2560 fused silica capillary column.

### CONCLUSION

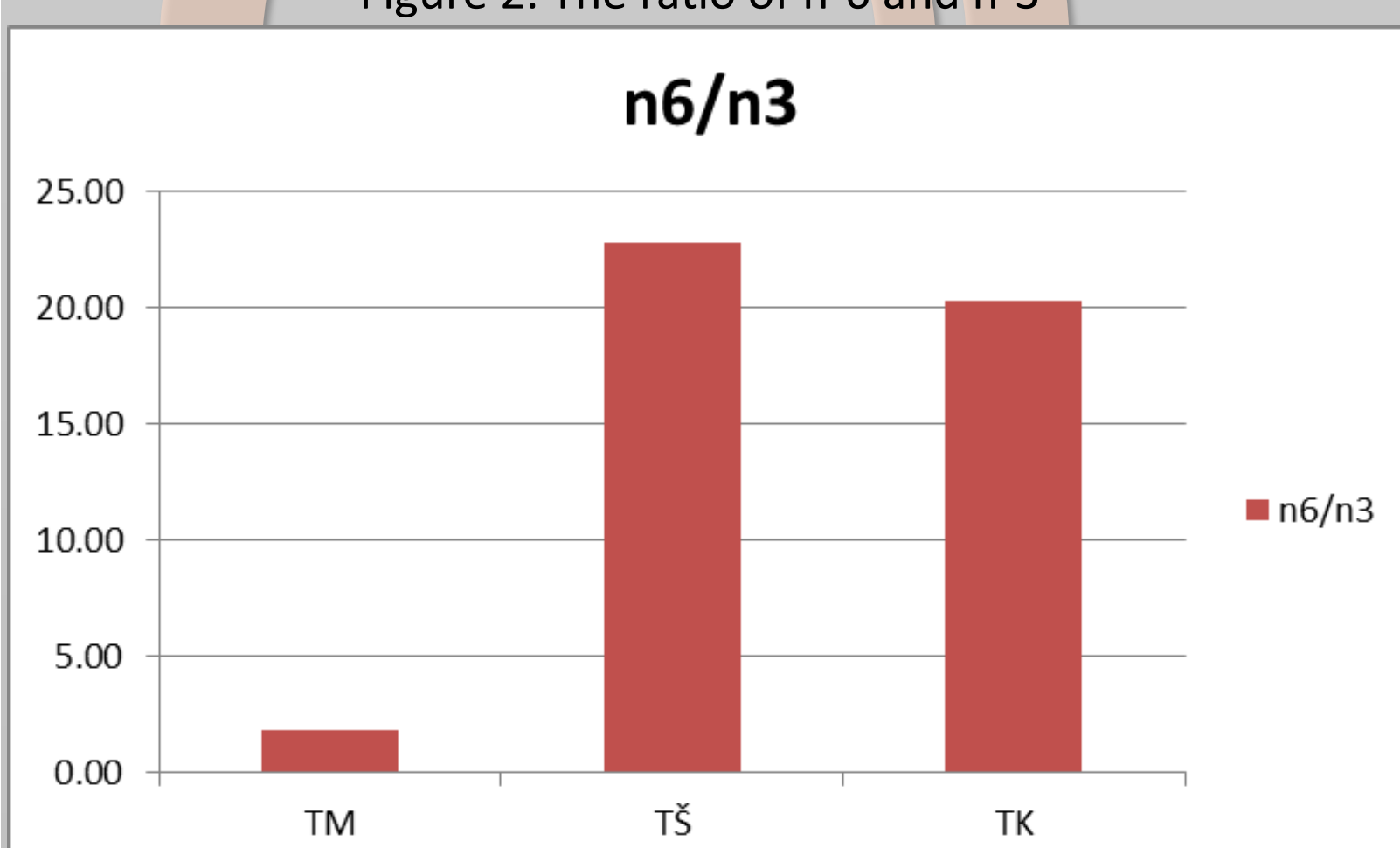
Fatty acid profile of mealworm can be enhanced with the adequate insect feed selection, while the most beneficial fatty acid profile was achieved with feed which was based on mix of carrot, cabbage and flax seed. Considering the content of essential n-3 and n-6 fatty acids it could be concluded that inclusion of mealworm into animal diet is very desirable and has a huge potential in animal feed industry.

### RESULTS AND DISCUSSION

The obtained results showed that mealworm had high content of lipids. Lipid content ranged from 25 to 33% based on dry matter. The highest lipid content was found in the mealworm which diet included mix of carrot, cabbage and flaxseed. Among saturated fatty acid (SFA) the most dominant was palmitic acid in all samples. Oleic acid was predominant monounsaturated acid (MUFA), while linoleic was predominant polyunsaturated fatty acid (PUFA, n-6 fatty acid). Furthermore, the concentration of n-3 increased tenfold in mealworm which diet included flaxseed and it ranged from 10,5 to 14%.



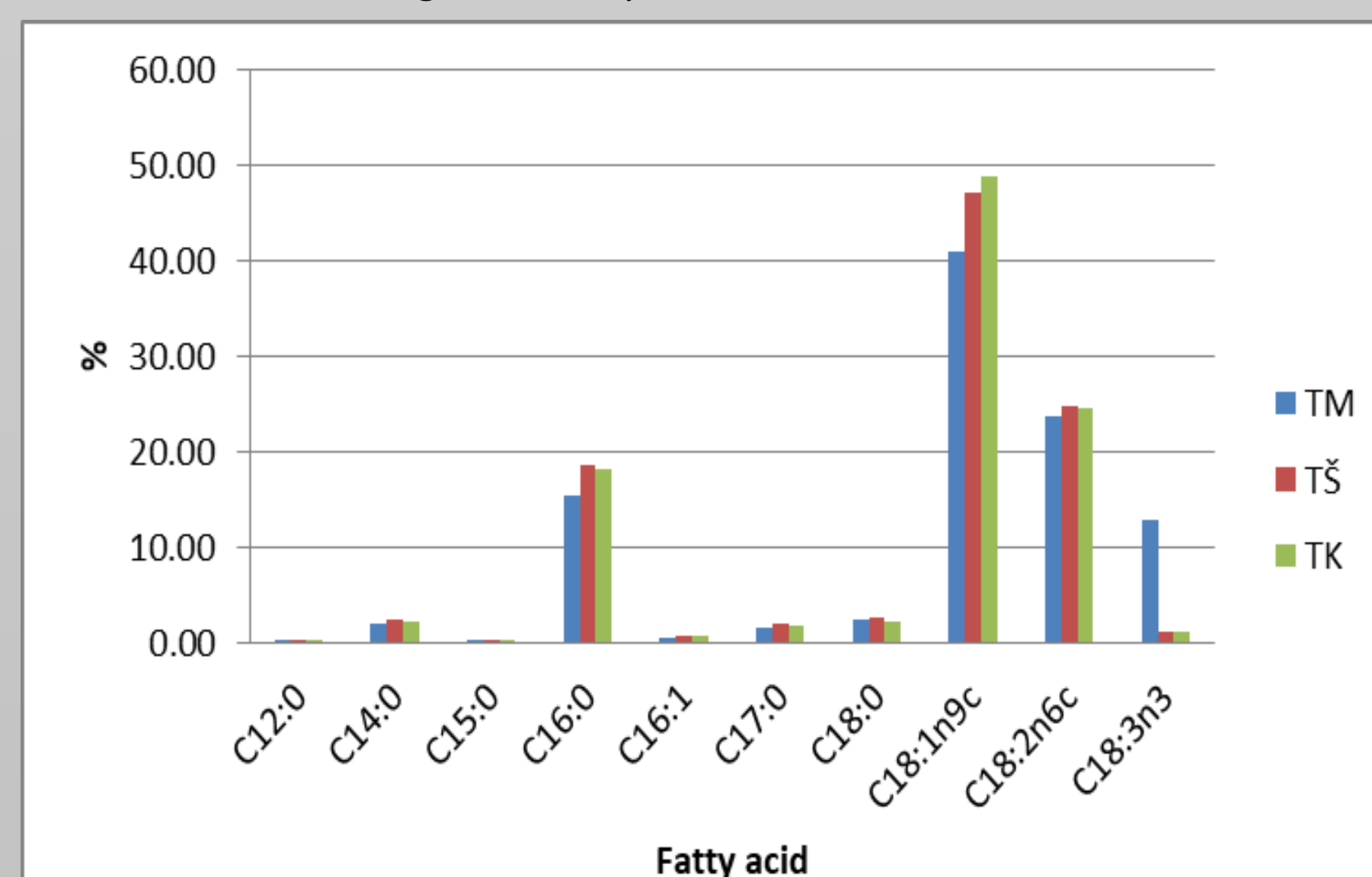
Figure 2. The ratio of n-6 and n-3



TM = *Tenebrio molitor* with diet included mix of carrot, cabbage and flaxseed  
TŠ = *Tenebrio molitor* with diet included carrot  
TK = *Tenebrio molitor* with diet included cabbage



Figure 1. Fatty acid content in mealworm



TM = *Tenebrio molitor* with diet included mix of carrot, cabbage and flaxseed  
TŠ = *Tenebrio molitor* with diet included carrot  
TK = *Tenebrio molitor* with diet included cabbage