Cholesterol content and fatty acid composition of egg yolk of grey nandu (*Rhea americana*)


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(Received November 10, 2003; accepted December 4, 2003)

In nandu eggs (n = 9) the mean cholesterol content of yolk was 16.41 mg/g. In a sum of 21 fatty acids determined, the considerable share – 33.55% – of polyunsaturated acids was found, and especially of linolenic (C18:3) – 4.95% and arachidonic (C20:4) – 7.59%, both considered essential in human nutrition. It is concluded that nandu eggs are of considerable dietetic value.

**KEY WORDS:** cholesterol / egg / fatty acid / nandu / yolk

Traditionally, for table consumption, almost exclusively used are chicken eggs. Recently, however, people turn to *Ratitae* eggs [Horbańczuk 1998, 2002] considered fashionable because of their original appearance as compared to eggs of chicken [Sales 1999]. Whereas only few studies have been conducted on the nutritive value of African ostrich eggs [Reiner et al. 1995, Noble et al. 1996, Horbańczuk et al. 1999], almost
no data are available on the quality of eggs of nandu [Lopez et al. 1998, Sales 2002]. This report presents an attempt at gaining information on the total cholesterol and fatty acids content of egg yolk of nandu kept on the Polish farm in conditions typical of east-central Europe.

Material and methods

Nine grey nandu (Rhea americana) eggs were obtained from nine different females kept on the nandu farm in Dąbki, near Zielona Góra, Poland, under EU standards [Horbańczuk 2002]. Immediately following collection the yolks were carefully removed from the eggs, samples of approximately 5 ml were obtained, vacuum-packed in plastic bags and stored at -20°C until analysed.

For determinations of cholesterol the total lipid fraction was extracted with chloroform-methanol mixture (2:1, v/v) after Folch et al. [1957]. Total cholesterol was determined colorimetrically according to Searcy and Berquist [1960].

For determination of fatty acids the samples of frozen yolks were freeze-dried and extracted with chloroform-methanol-water mixture (4:2:1, v/v). Derivatization reaction was carried out according to Czauderna and Kowalczyk [2001] and Czauderna et al. [2001]. The derivatized samples were filtered through a 0.2 µm membrane filter (WHATMAN). The filtrates were injected onto chromatographic column Spheri-5 RP-18, 5 µm, 220 × 4.6 mm (PERKIN ELMER, USA). Dibromoacetophenacyl esters of fatty acids were identified on a HPLC system Series 200 (PERKIN ELMER, USA). The development of the gradient elution system, collection, and data integration were performed with TURBOCHROM Workstation Ver. 6.1.2 software. All eluents were degassed under vacuum and then flushed with helium (99.996%, PRAXAIR, Poland). Elution was performed using methanol (MeOH) and acetonitrile-water (ACN:H2O, 40:60, v/v) 9:1, v/v mixture. The column temperature was maintained at 35°C and the eluted dibromo-acetophenylacetyl esters of fatty acids were identified at 242 nm. The elution of dibromo-acetophenacyl esters of C3:0-C20:5 fatty acids was completed within 40 min at a flow rate of 2.6 ml/min.

Cholesterol content was presented in mg/g of yolk, while individual fatty acids as per cent of their sum. Both were expressed as means and standard deviations.

Results and discussion

The mean cholesterol content of yolk reached 16.41 mg/g (Tab. 1) appearing similar to the value found in guinea fowl (16 mg/g) and intermediate between those reported for chicken (15-19 mg/g) and ostrich (13 mg/g) by Reiner et al. [1995], and Horbańczuk et al. [1999], respectively.

Total saturated fatty acids (SFA) in egg yolk reached 32.5% (Tab. 1). Higher value (34.4%) including, however, C16:0 and C18:0 only, were given by Reiner et al. [1995]
Among polyunsaturated fatty acids (PUFA), considerable shares of linolenic (C18:3 – 4.95%) and arachidonic (C20:4 – 7.59%) acids (Tab. 1) are markedly different from the figures preliminarily given by Lopez et al. [1998] who, for seven eggs of nandu from semi-captive populations in Argentina, reported the share of the two acids reaching 1.7 and 1.2%, respectively.
As shown in Table 1 the mean ratio PUFA/SFA in nandu egg yolk exceeded 1 whereas Lopez et al. [1998] determining only seven acids, found the ratio of 0.54.
The ratio SFA : MUFA : PUFA in nandu eggs yolk in the present study was found 1:1:1, what is very important from a dietetic point of view.
The data presented here constitute the first report on the content of as many as 21 fatty acids of the yolk of nandu eggs. As compared to chicken eggs, the egg yolk of nandu appears to contain similar level of cholesterol and shows higher share of PUFA, indicating its considerable dietetic value.
It is well known that the fatty acid composition of animal products can easily be altered by nutrition. Thus, apart from genetic factors, especially the influence of feeding regimen on cholesterol content and fatty acid composition of nandu eggs need further investigation.

REFERENCES
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Zawartość cholesterolu i skład kwasów tłuszczowych w żółtku jaja nandu (*Rhea americana*)

**S t r e s z c z e n i e**

W dziewięciu jajach nandu pozyskanych na fermie w Dąbkach koło Zielonej Góry średnia zawartość cholesterolu ogólnego wyniosła 16,41 mg/g żółtka. Suma 21 oznaczonych kwasów tłuszczowych zawierała 32,51% kwasów nasyconych i 33,55% wielonienasyconych. Kwas linolenowy (C18:3) stanowił 4,95%, a arachidonowy (C20:4) 7,59% sumy wszystkich kwasów. Wnioskuje się o wysokiej wartości dietetycznej jaj nandu.