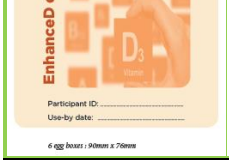


Vitamin D-enhanced eggs can protect against vitamin D deficiency in winter: evidence from a randomized controlled trial of adults

Low vitamin D status is common in the United States and Europe with 8% and 13% of the population, respectively, reported to have serious vitamin D deficiency (i.e. serum 25-hydroxyvitamin D [25(OH)D] concentration <30 nmol/L) [1,2]. There is a considerable mismatch between current intakes of vitamin D and recommended target intakes for the vitamin [3]. Fortification of a wider range of foods with vitamin D has been proposed as a strategy for increasing intake that would have the greatest impact on the population [4]. The use of 'bioaddition' which involves the addition of vitamin D to an animal's diet to increase the vitamin D content in the resultant food [5], deserves serious consideration as it may produce foods that are more acceptable to consumers as well as increase the intake of various vitamin D compounds leading to improved vitamin D status [6].

There have been numerous hen feeding studies which have shown that the vitamin D_3 and 25-hydroxyvitamin D content of eggs can be significantly increased by adding more vitamin D_3 and/or commercially available 25-hydroxyvitamin D to the feed of hens, although several of the studies used amounts above that which is legally allowed in the EU [for review, see 7]. Surprisingly however, the effect of consuming vitamin D-enhanced eggs on vitamin D status of healthy subjects in a randomized controlled trial (RCT) has not been tested. This type of RCT evidence is key as provides proof of effectiveness.

The key aim of this study was to investigate the effect of consumption of vitamin D-enhanced eggs [produced by feeding hens with either vitamin D_3 or 25-hydroxyvitamin D at the EU allowable maximum content] on maintaining serum 25(OH)D concentrations in healthy adults during winter, when vitamin D status would be expected to decline. Sensory evaluation studies of the vitamin D-enhanced eggs were conducted before the RCT part of the study was performed, to test and confirm their acceptability to consumers in terms of taste and other sensory characteristics.

In an 8-week RCT under the direction of Professor Kevin Cashman at the *Cork Centre of Vitamin D and Nutrition Research* (CCVDNR), 51 healthy adults (aged 45-70 years) completed a food-based dietary intervention during winter (January-March 2015) in which they were randomly allocated to three groups:

- A '*control*' group who usually consumed ≤ 2 eggs/week [these were commercially available eggs]
- A '*vitamin D_3-egg group*' who were willing to eat 7 eggs per week and who received 7 vitamin D_3-enhanced eggs per week
- A '*25D-egg group*' who were willing to eat 7 eggs per week and who received 7 25-hydroxyvitamin D-enhanced eggs per week

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Vitamin D-enhanced eggs from hens fed 25-hydroxyvitamin D (3000 IU/kg feed) or vitamin D_3 (3000 IU/kg feed) had a total vitamin D activity of 4.5 and 3.5 µg/egg, respectively. Serum 25(OH)D concentration (the best indicator of vitamin D status) was measured at baseline and at the end of the 8-week study using a CDC-certified liquid chromatography tandem mass spectrometry method [8].

The study showed that there was a statistically significant (P<0.001) decrease in serum 25(OH)D concentration in the *control* group over the 8 weeks of winter, whereas there was no change in serum 25(OH)D concentration in either the *vitamin D_3-egg group* or *25D-egg group* over the same period. The *vitamin D_3-egg* and *25D-egg* groups had significantly higher (P≤0.005) serum 25(OH)D compared with the *control* group at the end of the 8-week study, even after controlling for lower baseline 25(OH)D in the control group.

The percentage of subjects in each of the three groups that had serum 25(OH)D concentrations <25 nmol/L (the UK threshold of vitamin D deficiency; [9]) at the end of the study period were 22%, 0% and 0% for the *control*, *vitamin D_3-eggs* and *25D-eggs* groups, respectively (P=0.019).

Overall, this study showed that consumption of 7 vitamin D_3- or 25-hydroxyvitamin D-enhanced eggs, both of which were found to be acceptable to consumers, maintained serum 25(OH)D concentrations and protected against its decline during the 8 weeks of winter.

Click on the following link to access the paper describing the full study.
http://ajcn.nutrition.org/content/104/3/629.long

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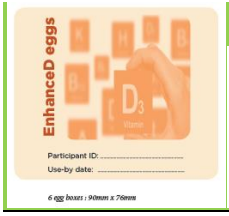


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