ADVISORY COMMITTEE ON ANIMAL FEEDINGSTUFFS

45th Meeting of ACAF on 4 March 2009

Discussion Paper

Re-assessment of Maximum Permitted Levels of Vitamin A in Animal Feed

Action: The Committee is asked to comment on the recent Opinion from the European Food Safety Authority (EFSA), in particular on the proposed changes to the maximum permitted levels for pre-formed Vitamin A in feed with respect to animal health and welfare.

Secretariat: February 2009

Re-assessment of Maximum Permitted Levels of Vitamin A in Animal Feed

Purpose

1. This paper invites the Committee to consider the recent Opinion from EFSA on Vitamin A in feed, and to comment on EFSA's recommendations for changes to the existing controls on the use of Vitamin A as a feed additive.

Background

2. Several years ago an assessment was undertaken by the Scientific Advisory Committee on Nutrition (SACN), on a possible link between osteoporosis (brittle bone disease) and high consumer exposure to Vitamin A. ACAF provided advice to SACN regarding the contribution to total intake from animal-derived food as a result of the presence of Vitamin A and its precursors in feed.

3. SACN published its advice in 2005. Essentially, it did not recommend a reduction in Vitamin A intake for all consumers, but suggested that those groups with high intakes and/or those at increased risk of osteoporosis need not increase their consumption of vitamin A-rich food, or take vitamin A supplements. SACN also recommended that research should be undertaken to determine whether the Vitamin A content of animal feed could be reduced without adversely affecting the welfare and productivity of livestock.

http://www.sacn.gov.uk/pdfs/sacn_vita_report.pdf

4. Where Vitamin A is added to feed, its use is controlled by feed additive legislation (European Parliament and Council Regulation 1831/2003). Maximum limits are set for Vitamin A in feed for certain (but not all) animal categories.

Previous discussions

5. The possible link between high levels of Vitamin A in feed and osteoporosis was discussed by ACAF at its 30th and 32nd meetings (5 July and 21 November 2005). At the July 2005 meeting the Committee expressed some concerns about a substantial reduction of maximum permitted levels for Vitamin A in feed (e.g. a reduction in Vitamin A levels in milk with lower intakes for children, and animal welfare). The Committee agreed that further information regarding use levels and dietary requirements of Vitamin A should be sought (ACAF/05/15 – see Annex 1).

6. In November 2005 the Committee received a summary of information provided by stakeholders in response to a request for information concerning daily requirements and actual use levels of Vitamin A (ACAF/05/31 – see Annex 2). Members were advised that a discussion had been held at the 26/27 September 2005 meeting of the Standing Committee on the Food Chain and Animal Health (SCoFCAH), with a view to obtaining an assessment from the European Food Safety Agency (EFSA). It was agreed that the Committee that would consider the matter again once EFSA had published its advice.

Recent Developments

7. On 3 February 2009 EFSA published its Opinion on the use of Vitamin A in animal feed:

http://www.efsa.europa.eu/cs/BlobServer/Scientific_Opinion/feedap_op_ej873_vitamin_a_en.pdf?ssbinary=true

8. A summary of the EFSA Opinion is attached at Annex 3. EFSA stated that the largest single contribution to consumer total pre-formed Vitamin A intake is from liver consumption. It is also stated that there is, in general, a link between levels of Vitamin A in feed and the resulting animal-derived foods. However, the Opinion states that it is only possible to predict Vitamin A levels in liver from the concentration in pig feed. A reduction in the maximum permitted level for Vitamin A in feed for this species would be expected to reduce the Vitamin A levels in pork liver at the higher end of the range. EFSA states that reductions in maximum limits for Vitamin A in other food-producing species (that are acceptable from an animal welfare and production position) would not lead to a predictable reduction of Vitamin A in the corresponding food.

9. EFSA's Animal Feed Panel (FEEDAP) suggested some changes to the limits for Vitamin A in complete feed/daily ration. The table in Annex 4 provides a comparison of the current controls with the revised maximum limits proposed by EFSA. The limits apply where Vitamin A is intentionally added to feed (i.e. they do not include naturally-occurring Vitamin A or pro-Vitamin A in feed materials), and are expressed in International Units (IU) of Vitamin A per kg of complete feed with a moisture content of 12%. EFSA has not yet provided specific advice relating the use of vitamin A in food supplements, or in fortification of foods (e.g. margarine).

Likely future developments

10. Any changes to the current controls on the use of Vitamin A as a feed additive would have to be made via a proposal from the European Commission for an amending Regulation. This would be subject to a vote at the Commission's Standing Committee of the Food Chain and Animal Health (SCoFCAH). There has been insufficient time for Member States and the Commission to discuss the EFSA Opinion. However, it is likely that the European Commission will place the issue on the agenda for a forthcoming SCoFCAH meeting. The Secretariat will keep the Committee informed of developments.

Action

11. The Committee is invited to comment on the recent EFSA Opinion in particular on the proposed changes to the maximum permitted levels for pre-formed Vitamin A in feed with respect to animal health and welfare.

ACAF Secretariat
February 2009

ADVISORY COMMITTEE ON ANIMAL FEEDINGSTUFFS

30th Meeting of ACAF on 5 July 2005

Discussion Paper

SCIENTIFIC ADVISORY COMMITTEE ON NUTRITION (SACN) VITAMIN A REPORT

Action required: The Committee is asked to comment on the recommendation in SACN's Vitamin A Report which suggests that consideration should be given to a reduction in retinol intake of poultry and livestock feed as part of a strategy to reduce the retinol intake of regular consumers of liver. The Committee's comments would be particularly welcome on the effect of this recommendation in relation to animal welfare and livestock rearing.

Secretariat June 2005

SCIENTIFIC ADVISORY COMMITTEE ON NUTRITION (SACN) VITAMIN A REPORT

Purpose

1. The aim of this paper is to seek a view from ACAF on one of the recommendations that appear in SACN's Vitamin A Report.

Background

2. In May 2003 the Food Standards Agency (FSA) asked SACN to reassess dietary advice to consumers on foods and supplements containing vitamin A, after experts[1] highlighted evidence that suggested high intakes of vitamin A may increase the risk of bone fractures in the long term.

3. A subgroup of SACN was established with the following terms of reference:

    - *To review the current advice to consumers on vitamin A intakes and consumption of liver;*

    - *To consider other strategies that might reduce the retinol[2] intake of higher consumers.*

4. Extracts from the draft report and a link to the full draft report were circulated to ACAF members on 24 January 2005 (attached at Annex I). The final report is expected to be published later this year.

5. SACN's initial conclusions are that although there is insufficient evidence on the relationship between vitamin A and bone health to warrant a change in advice to all consumers, it may be advisable for some population groups to limit their vitamin A intakes. As a precaution, the report concludes that it may be advisable for people who eat liver regularly, i.e. once a week or more, not to increase this amount and to avoid taking supplements containing vitamin A. This is because liver is a particularly rich source of vitamin A and contains much higher amounts than other foods. The draft report also concludes that it may be advisable for people who are particularly at risk to bone fractures, namely post-menopausal women and older people, not to consume more than 1.5 mg of vitamin A a day.

[1] The Expert Group on Vitamins and Minerals.
[2] 'Retinol' is preformed vitamin A only found in foods of animal origin (e.g. liver, dairy products, eggs, butter and margarine).

6. The draft conclusions also reinforce current advice that women who are pregnant or thinking of having a baby should avoid taking supplements containing vitamin A and avoid eating liver or liver products, due to the fact that exposure to high levels of vitamin A can harm an unborn baby.

0. The draft report makes a number of recommendations. Of particular interest to ACAF is a recommendation that suggests a reduction in the vitamin A content of liver would help reduce the intake of high level consumers, and a likely way of achieving this would be through a reduction in animal feed supplementation.

0. It has been suggested that a reduction in vitamin A levels in liver of 50% should be the target. However, this may not correspond simply to a 50% reduction in an animal's vitamin A intake. At present there appears to be no valid way to model feed and corresponding food levels of vitamin A.

0. Supplementation of retinol in the diets of livestock and poultry is essential for maintaining general health, productivity, reproduction and immune status. The implications of lowering the levels of retinol supplementation should therefore be determined.

Action

0. The Committee is asked to comment on the recommendation in SACN's Vitamin A Report which suggests that consideration should be given to a reduction in retinol intake of poultry and livestock feed as part of a strategy to reduce the retinol intake of regular consumers of liver. The Committee's comments would be particularly welcome on the effect of this recommendation in relation to animal welfare and livestock rearing.

ACAF Secretariat
Food Standards Agency
June 2005

Annex I

Extract from SACN's draft Vitamin A Report:

6 RETINOL CONTENT OF LIVER AND ANIMAL FEEDING PRACTICES

143. As a detailed review of animal feed issues is outside the remit of SACN, they are only considered briefly in relation to retinol.

144. The retinol content of liver is high and varies widely between animals, both within and between species (Scotter et al, 1992). Calf liver contains the highest level (25,200µg/100g) closely followed by pig liver (22,600µg/100g) and lamb liver (19,700µg/100g); lowest retinol concentrations are found in chicken liver (10,500µg/100g) (FSA, 2002).

145. Concentrations of retinol in animal products (milk, meat, eggs) are strongly correlated with the level of retinol in the diets of the animals producing them.

146. For many non-ruminant livestock, diets are supplemented with synthetic retinol (usually as retinyl acetate). The maximum content of feeding stuffs for fattening farm animals in the EU is set by the European Commission (Directive 70/524/EEC, as amended).

147. In ruminants, provitamin A carotenoids in grass and other forages are converted to retinol. However, because both the concentration of carotenoids in forages and the efficiency of conversion to retinol are variable, supplementation of ruminant diets is common. Being fat-soluble, levels of retinol in milk closely follows the milk fat content and as a result, there are clear seasonal differences in the retinol content of bovine milk. These differences, however, may be modified by changes in the concentrations of retinol or provitamin A carotenoids in the diets of dairy cows. No maximum content has been set for the diet of lactating dairy cows.

148. On many farms, the young, recently weaned calf is the animal at greatest risk of developing retinol deficiency. Furthermore, retinol concentrations in the livers of pre-ruminant calves decline rapidly when the diet contains low levels of retinol (Swanson et al, 2000). For this reason, maximum permitted contents of retinol in milk replacers for feeding calves are higher than for other feed materials. The higher levels of retinol in calf livers may therefore be the result of both higher fetal exposure and higher retinol concentrations in milk replacer powders.

149. Data from analyses of feeding stuffs by local authorities (FSA, 2005) show that the retinol content of animal feed may exceed the maximum content in some cases. Although this analysis was not carried out on representative samples from across the UK, it provides a useful indication of the situation. The practice of adding nutrients to products at levels higher than those stated on the label is known as *overage*. It is employed by some feed manufacturers to ensure that products contain at least the amount stated on the label throughout their shelf life, which may be up to 3 years.

Summary and Conclusions

150. The wide range of retinol content in animal products reflects the wide variation in livestock production systems in the UK.

151. Retinol concentrations in animal products are closely related to retinol concentration in feed. Lowering retinol supplementation of feeds would be expected to result in a reduction in the retinol concentrations in animal products.

152 An adequate retinol intake is essential for maintaining productivity, reproduction and the immune status of poultry and livestock. A reduction in retinol supplementation of poultry and livestock, as part of a strategy to reduce retinol intake by human consumers, should only be considered when the veterinary implications of lower levels of retinol supplementation have been determined.

Recommendation

177. A reduction in retinol content of poultry and livestock feed as part of a strategy to reduce the retinol intake of regular consumers of liver should be explored further. The implications of lower levels of retinol supplementation for the welfare and productivity of poultry and livestock would need to be determined should such a strategy be considered.

ADVISORY COMMITTEE ON ANIMAL FEEDINGSTUFFS

32nd Meeting of ACAF 21 November 2005

Information Paper

RESPONSES RECEIVED FROM STAKEHOLDERS IN RESPONSE TO A REQUEST FOR INFORMATION CONCERNING DAILY REQUIREMENTS AND ACTUAL USE LEVELS FOR VITAMIN A IN DIETS FOR FOOD-PRODUCING ANIMALS.

Secretariat November 2005

ACAF/05/31

RESPONSES RECEIVED FROM STAKEHOLDERS IN RESPONSE TO A REQUEST FOR INFORMATION CONCERNING DAILY REQUIREMENTS AND ACTUAL USE LEVELS FOR VITAMIN A IN DIETS FOR FOOD-PRODUCING ANIMALS.

Purpose

1. To update the Committee on stakeholder responses to a request for information concerning the daily requirements and actual use levels of vitamin A in the diets of food-producing animals.

Background

2. Earlier this year the Committee was invited to comment on the report of the Scientific Advisory Committee on Nutrition (SACN) on Vitamin A. In particular the Committee was asked to comment on a recommendation which suggested that consideration should be given to a reduction in retinol intake of poultry and livestock feed as a part of a strategy to reduce the retinol intake of regular consumers of liver.

3. The Committee discussed the issue at its meeting on 5 July 2005 and raised a number of concerns. The Committee concluded that it would be inappropriate to ask farmers to accept a reduction in vitamin A supplementation of animal feed when it was unclear what effects this would have on animal health and welfare, and when it was also unclear if it would have the desired effect in reducing vitamin A content of liver for human consumption.

4. Following ACAF's discussion, the Animal Feed Unit of the Food Standards Agency sent a letter to interested parties requesting data and views concerning daily requirements for vitamin A for food producing animals.

Responses

5. Key points raised in responses received were:

- The vitamin A issue for food producing animals is a complex one. It might not be possible to give advice as to what the daily requirement is for a particular animal category in the European Community due to differences, e.g. rearing regimes, breeds and health/nutritional status.

- Animals at pasture generally receive higher levels of dietary vitamin A in their diets and there is some evidence that they may also have higher liver stores of vitamin A than those receiving supplemented manufactured feed.

- There is a genuine need to continue to supplement most compound feeds, as some of their components contain little or no vitamin A. The use of such supplementation in feed for cattle might be better targeted for the nutritional needs of the animal.

- Experts cannot agree precisely what the daily requirements for vitamin A are for categories of food producing animals. These would be expected to depend partly on the health and nutritional status of the animal, the rearing/feeding regime, and on the animal breed or type. In addition, respondents do not seem to agree (for cattle at least) as to what the daily recommended intakes of vitamin A actually are.

- Actual levels of vitamin A in manufactured complete feeds are generally claimed to be about 75% of the corresponding maximum permitted limit. (The limit only applies where the vitamin has been deliberately added to the diet; it does not apply to unsupplemented forages or pastures containing high levels of pre-retinols.)

6. Additionally, the Animal Feed Unit also wrote to the European Commission asking for the matter to be considered by the Standing Committee on the Food Chain and Animal Health (SCOFCAH). There was an initial discussion of the subject at the Standing Committee's meeting on 26/27 September 2005. It was agreed that there did appear to be a lack of published data on the issue, including the link between vitamin A supplementation and its transfer into animal produce.

7. The Commission said that it was a complicated question that covered a number of factors, including the implications for animal nutrition and consumers of livestock products, and it thought the best way forward would be to put the issue to the European Food Safety Authority (EFSA). The Commission said that it would return to vitamin A at a forthcoming meeting of SCOFCAH, but in the meantime it asked Member States to provide any data or references they had, to assist in an EFSA review.

8. The Secretariat will keep the Committee informed of developments.

ACAF Secretariat
Food Standards Agency
November 2005

Consequences for the consumer of the use of vitamin A in animal nutrition

Scientific Opinion of the Panel on Additives and Products or Substances used in Animal Feed

(Question No EFSA-Q-2006-121)

Adopted on 19 November 2008

SUMMARY

The fat soluble vitamin A is required in humans and animals. It is essential for vision, growth differentiation and proliferation of a wide range of epithelial tissues, bone growth, reproduction and embryonic development. Vitamin A is present in the diet as preformed vitamin A (retinol and its esters) and can also be derived in humans and most animal species from dietary carotenoids, mainly ß-carotene. Vitamin A accumulates in the body, particularly in liver, and is toxic at high doses in most species studied. The use of vitamin A as a feed additive is currently authorised under Regulation (EC) No 1831/2003 as nutritional additive with maximum contents for a number of animal categories and types of feedingstuffs.

Two reports, one from the UK's Scientific Advisory Committee on Nutrition (SACN) and the other from the Agence Française de Sécurité Sanitaire des Aliments (AFSSA), both published in 2005, drew attention to the risks of high levels of vitamin A for the consumer resulting from the intake of products of animal origin.

The Commission asked the European Food Safety Authority (EFSA) to review those reports. Should the overall intake exceed the tolerable upper intake level (UL) for vitamin A, EFSA should comment on the benefit of decreasing the maximum permitted levels of addition for vitamin A. In addition, EFSA should also advise on the potential zootechnical implications of lowering the levels of vitamin A intake by food-producing animals. In that respect, consequences for the safety of target animals and the environmental impact should be assessed.

The UL set by SCF (3 000 µg RE from preformed vitamin A day^{-1}) was considered by the Panel on Additives and Products or Substances used in Animal Feed (FEEDAP) as still being appropriate, taking into account the available data. Quantitative correlations between retinol intake and bone health risk justifying the establishment of a lower UL for a specific population subgroup (elderly people) could not be established. A maximum intake of 1 500 µg RE day^{-1} would therefore — until new data indicates the necessity of a re-evaluation — serve as a guidance level (GL) for persons at a greater risk of osteoporosis and bone fracture (particularly postmenopausal women).

The FEEDAP Panel considered four national studies on the intake of vitamin A in adults (three countries) and one in children. The Panel also made a separate calculation on the vitamin A intake of adults based on the food consumption survey within the EPIC project (27

study centres, ten European countries, consumption of relevant food groups, published in 2002).

Only preformed vitamin A is to be considered of safety concern. This is only found in foods of animal origin. Whereas in the period from 1970 to 1990 an increase in liver preformed vitamin A could be observed (mainly for pigs and cattle), a reverse trend seemed to start in the early nineties. Current typical values are 50–150 µg RE g^{-1} liver, with upper values of up to 500 µg, 4–14 µg RE g^{-1} milk fat, 4–9 µg RE g^{-1} egg yolk. Other food sources (meat, kidney and fish flesh) do not contain significant amounts of preformed vitamin A. Losses of vitamin A during food processing are known but difficult to quantify for refinement of vitamin A intake estimations, and could therefore not be taken into account.

Approximately, about half of the intake of total vitamin A in European consumers comes from carotenoids in foodstuffs of plant origin, the other half from preformed vitamin A in foodstuffs of animal origin. The mean intake of preformed vitamin A in the adult population in Europe is estimated between 400 and 1 200 µg RE day^{-1} in men and between 350 and 1 000 µg RE day^{-1} in women. A small proportion of the European population shows an intake of preformed vitamin A above the UL. This proportion is about 1–2 % in Denmark, Germany, the Netherlands, Norway, Sweden and the UK, and about 3–6 % in France, Greece, Italy and Spain. The corresponding GL is exceeded by 2–3 and 8–14 %, respectively.

The main exposure to preformed vitamin A comes from consumption of liver (with about 60–80 % in some Member States) and milk, including all dairy products (with about 45–60 % in others). Despite the uncertainties associated with the assessment of preformed vitamin A intake from liver, it can be concluded that among liver eaters, the consumption of liver as such may lead to daily intakes of 2 800–7 000 µg preformed vitamin A. It is considered highly unlikely that consumers would exceed the UL from the intake of milk and dairy products alone.

It can be concluded that the risk of exceeding the UL (and GL) for preformed vitamin A is predominantly related to liver consumption, but also from the consumption of supplements containing vitamin A.

Preformed vitamin A may raise safety concerns because of its high levels in some foods of animal origin and of individual consumption patterns; therefore, feeding practice should seek to avoid any unnecessary high concentration in those foods.

The following potential maximum contents of vitamin A in feed have been derived for pigs: 16 000 IU vitamin A kg^{-1} for piglets, 6 500 IU vitamin A kg^{-1} for pigs for fattening, 12 000 IU vitamin A for gestating sows and 7 000 IU vitamin A kg^{-1} for lactating sows; for cattle: 25 000 IU vitamin A kg^{-1} for veal calves, 10 000 IU vitamin A kg^{-1} for cattle for fattening and lactating cows, and 20 000 IU vitamin A kg^{-1} for dry cows; and for poultry: 20 000 IU vitamin A kg^{-1} in the first 14 days of life for chickens reared for laying and for fattening and in the first 28 days of life for turkeys for fattening, 10 000 IU vitamin A kg^{-1} for chickens reared for laying and for fattening (after 14 days), for turkeys for fattening (after 28 days), and for laying hens and breeder turkeys. For fish and minor species (other poultry, other ruminants, rabbits and horses), there are insufficient data available to derive maximum contents with the necessary accuracy.

The derived maximum concentrations in feed for food-producing animals will probably not reduce the typical preformed vitamin A concentrations in tissues and products but result in more uniform contents, thus avoiding extreme high values.

The FEEDAP Panel recommends as a measure for the protection of consumers the introduction of revised maximum vitamin A contents for feed for most food-producing animals. The Panel further recommends (i) the limitation of vitamin A in the daily ration by regulating complementary feedingstuffs, (ii) the monitoring of preformed vitamin A in foods of concern after introduction of revised maximum contents and (iii) the extension of advice to consumers to avoid excessive intake of preformed vitamin A.

Key words: vitamin A, preformed vitamin A, retinol, RE (retinol equivalents), intake in humans, toxicity, UL (tolerable upper intake level), GL (guidance level), vitamin A requirement, vitamin A allowance, maximum content, food of animal origin, liver, milk, dairy products, eggs

Annex 4

Current and proposed controls for pre-formed vitamin A in feed

Animal category	**Current limits for vitamin A (IU/kg)[1]**	**EFSA's suggested limits (IU/kg)[1]**
-piglets	-	16 000
-pigs for fattening	13 500	6 500
-gestating sows	-	12 000
-lactating sows	-	7 000
-veal calves	25 000[2]	25 000
-cattle for fattening	13 500	10 000
-lactating cows	-	10 000
-dry cows	-	20 000
-lambs for fattening	13 500	(as current)
-chickens reared for fattening up to 14 days -turkeys for fattening up to 28 days	13 500	20 000
-chickens reared for laying up to 14 days	-	20 000
- chickens reared for fattening, after 14 days -turkeys for fattening, after 28 days	13 500	10 000
-chickens reared for laying, after 14 days -laying hens -breeding turkeys	-	10 000
-ducks for fattening	13 500	(as current)

[1] International Units (IU) of vitamin A per kg of complete feed with a moisture content of 12%

[2] For milk replacers only.