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National Organic Standards Board
USDA-AMS-NOP
1400 Independence Ave. SW
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Washington, DC 20250-0268

Re. LS: Methionine petition and sunset

These comments to the National Organic Standards Board (NOSB) on its Spring 2015 agenda are submitted on behalf of Beyond Pesticides. Founded in 1981 as a national, grassroots, membership organization that represents community-based organizations and a range of people seeking to bridge the interests of consumers, farmers and farmworkers, Beyond Pesticides advances improved protections from pesticides and alternative pest management strategies that reduce or eliminate a reliance on pesticides. Our membership and network span the 50 states and groups around the world.

In general, we support the minority report on the methionine petition. The majority proposal does not give adequate support for a regulatory decision that reverses a previous NOSB decision to phase out methionine and incentivize alternative approaches to managing poultry. There is no documentation for statements made (some of which are taken directly from the petition with no justification). The minority report includes some supporting citations and supports ongoing research into natural sources of methionine. We submit additional support for an expeditious phase out of methionine.

The Livestock Subcommittee majority has not responded to the NOSB.

At the spring 2014 meeting in San Antonio, the NOSB was prohibited by NOP from taking up the question of whether an expiration date should be added to the methionine listing. Despite challenges from NOSB members, NOP determined that the attachment of an expiration date annotation on a new listing for methionine was a substantive change to the motion and untimely. When the issue was sent back to the subcommittee, it was with the suggestion that the issue of the expiration date could be separated from the issue of the methionine rates. In fact, it is apparent from the majority proposal and Livestock Subcommittee minutes that the subcommittee did not give any consideration to an expiration date.

Status of methionine in European Union (EU)

The majority proposal seems to imply, because of its lack of clarity, that the EU permits the use of synthetic methionine by virtue of the allowance of 5% non-organic feed for poultry. However, that allowance, like the allowance of non-organic ingredients in USDA organic food, is subject to other restrictions. One restriction is that “growth promoters and synthetic amino-

acids shall not be used."[1] Another is that materials other than organic feed must be listed in Annex V or VI,[2] and methionine is listed in neither place.

Synthetic methionine is not necessary for animal welfare.

The claim has been made that the use of synthetic methionine is essential for the welfare of poultry. This claim is not supported with established measures of animal welfare and data separating the impact of synthetic methionine from that of management choices. It is not supported by the research results reported by the Methionine Task Force (MTF) in its 2009 petition.[3] The European Union does not allow the use of synthetic methionine in organic poultry,[4] but does require more space per bird, fewer birds per house, and more access to the outdoors.[5] Significantly, the EU also requires that poultry be of slow-growing breeds or be slaughtered at an older age. The contribution of all these factors to the welfare of poultry has been documented.

Studies show that reduced stocking rates (both density and group size),[6] outdoor access,[7] and slower-growing birds (who use the outdoors more effectively), [8] but not synthetic methionine and cystine[9] have a positive impact on the welfare of poultry.

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[1] Council Regulation (EC) No 834/2007, consolidated. p. 20. http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:02007R0834-20130701&qid=1416479300107&from=EN.

[2] http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:02008R1235-20140803&qid=1416479175825&from=EN.

[3] Petition for Amending the National List of the USDA's National Organic Program: DL- Methionine, ML-Methionine Hydroxy analog, and DL-Methionine-hydroxy analog calcium-for use only in organic poultry production submitted by the Methionine Task Force. July 31, 2009. Pp. 17-18. http://www.ams.usda.gov/AMSv1.0/getfile?dDocName=STELPRDC5084508&acct=nopgeninfo

[4] "[G]rowth promoters and synthetic amino-acids shall not be used." Council Regulation (EC) No 834/2007, consolidated. p. 20. http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:02007R0834-20130701&qid=1416479300107&from=EN; EU organic livestock summary http://ec.europa.eu/agriculture/organic/eu-policy/eu-rules-on-production/livestock/index_en.htm.

[5] EC regulation No. 889-2008, Article 12.

[6] de Jong I, Berg C., Butterworth A., Estevéz I., 2012. Scientific report updating the EFSA opinions on the welfare of broilers and broiler breeders. Supporting Publications 2012:EN-295. [116pp.]. Available online: www.efsa.europa.eu/publications Beloor, J., Kang, H. K., Kim, Y. J., Subramani, V. K., Jang, I. S., Sohn, S. H., & Moon, Y. S. (2010). The effect of stocking density on stress related genes and telomeric length in broiler chickens. *Asian-Aust. J. Anim. Sci*, *23*(4), 437-443. Buijs, S., Keeling, L., Rettenbacher, S., Van Poucke, E., & Tuyttens, F. A. M. (2009). Stocking density effects on broiler welfare: Identifying sensitive ranges for different indicators. *Poultry Science*, *88*(8), 1536-1543.

[7] Mahboub, H. D. H., Müller, J., & Von Borell, E. (2004). Outdoor use, tonic immobility, heterophil/lymphocyte ratio and feather condition in free-range laying hens of different genotype. *British Poultry Science*, *45*(6), 738-744. Knierim, U. (2006). Animal welfare aspects of outdoor runs for laying hens: a review. *NJAS-Wageningen Journal of Life Sciences*, *54*(2), 133-145. Bestman, M. W. P., & Wagenaar, J. P. (2003). Farm level factors associated with feather pecking in organic laying hens. *Livestock Production Science*, *80*(1), 133-140.

[8] Sossidou, E. N., Dal Bosco, A., Elson, H. A., & Fontes, C. M. G. A. (2011). Pasture-based systems for poultry production: implications and perspectives. *World's Poultry Science Journal*, *67*(01), 47-58.

[9] Kjær, J. B., & Sørensen, P. (2002). Feather pecking and cannibalism in free-range laying hens as affected by genotype, dietary level of methionine+ cystine, light intensity during rearing and age at first access to the range area. *Applied Animal Behaviour Science*, *76*(1), 21-39.

The majority proposal says, "[T]here emerged a trend that flocks on the lower rates of MET had an increased tendency to demonstrate more stress related issues, including feather pecking and cannibalism. In discussion with stakeholders who provided input, the availability of outdoor access did not seem to have a significant impact on this trend." No peer-reviewed research has been presented to support this opinion. From the citations above, it appears likely that any failure of outdoor access to alleviate feather-pecking and cannibalism, as observed by these unnamed observers, is due partly to the fast-growth breeds, which do not use the outdoors as well as the slow-growth breeds used in EU organic production. The relationship between lack of synthetic methionine and feather-pecking is not supported by research.

Synthetic methionine is hormonally active.

Dr. Walter Goldstein of the Mandaamin Institute submitted to the NOSB evidence that synthetic methionine "up-regulates production of growth hormone insulin-like growth factor I (IGF-1)."[10] Dr. Goldstein documents with citations from peer-reviewed studies the following facts with regard to the endocrine effects of methionine. Synthetic methionine strongly increased growth and food consumption while depressing thyroid hormone production (T3).[11] Methionine stimulates production of plasma IGF-1 and associated genes.[12] A study examining RNA expression of both IGF-1 and growth hormone receptor concluded that the general mechanism by which methionine stimulates growth is by stimulating synthesis and release of the growth factor.[13] IGF-1 also seems to regulate egg production, and synthetic methionine increases IGF-1 production.[14] Human athletes who consciously consume methionine-rich diets to stimulate the production of IGF-1 to build their bodies suffer long-term problems with performance, lowered longevity and greater risk of cancer.[15] Thus, there is an analogy to recombinant bovine growth hormone (rBGH, also known as bovine somatotropin (BST)), which upregulates production of IGF-1, and IGF-1 prevents death of milk producing cells in the udder, thereby increasing milk production. The evidence shows that methionine is not only an amino acid building-block for protein, but also an inducer of a powerful growth hormone."

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[10] Walter Goldstein, letter to National Organic Standards Board dated November 26, 2014. Pp. 5-6.

[11] Carew, L.B., J.P. McMurtry, F.A. Alster. 2003. Effects of methionine deficiencies on plasma levels of thyroid hromones, insulin like growth factors-I and II, liver and body weights, and feed intake in growing chickens. Poultry Science 82:1932-1938.

[12] Wen, C., P. Wu, Y. Chen, T. Wang, Y. Zhou. 2013. Methionine improves the performance and breast muscle growth of broilers with lower hatching weight by altering the expression of genes associated with the insulin-like growth factor-I signalling pathway. British Journal of Nutrition.

[13] Del Vesco, A.P., E. Gasparino, A.R. Oliveira Neto, S.E.F. Gulmaraes, S.M.M. Marcato, and D.M. Voltolini. 2013. Dietary methionine effects on IGF-1 and GHR mRNA expression in broilers. Genetics and Molecular Research 12(4):6414-6423.

[14] Kim, M.H., D.S. Seo, Y. Ko. 2004. Relationship between egg productivity and insulin-like growth factor-1 genotypes in Korean native Ogol chickens. Poultry Science 83:1203-1208.

[15] Stoppani, J. 2012. Insane Growth Factors.: nutrition strategies to supersize your physique. http://www.bodybuilding.com/fun/insane-growth-factors-nutrition-to-supersize-your-physique.html Scarth, J.P. 2006. Modulation of the growth hormone insulin like growth factor (GH-IGF) axis by pharmaceutical, nutraceutical and environmental xenobiotics: an emerging role for xenobiotic-metabolizing enzymes and the transcription factors regulating their expression. A review. Xenobiotica 36(2-3):119-218.

To put the hormone discussion into a broader context, it helps to look at research on methionine in other animals. Aside from poultry, studies have shown that methionine upregulates IGF-1 and/or reduces the lifespan in fruit flies,[16] pigs,[17] mice,[18] rats,[19] and rabbits.[20] Recently, growth hormone signaling has been shown to be essential to the negative effect of methionine on lifespan.[21] This research has promoted enough interest in the gerontology field to inspire a mini-symposium devoted to the connection between methionine intake and aging.[22]

All of this research shows that methionine acts as a growth promoter above and beyond its role as a protein building block. It shows that methionine has an inverted-U dose-response curve typical of hormonally-active chemicals. To speak of methionine "deficiency" in this context is

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[16] Troen, A. M., French, E. E., Roberts, J. F., Selhub, J., Ordovas, J. M., Parnell, L. D., & Lai, C.-Q. (2007). Lifespan modification by glucose and methionine in *Drosophila melanogaster* fed a chemically defined diet. *Age*, *29*(1), 29–39. doi:10.1007/s11357-006-9018-4. "Dietary methionine was related to lifespan by **an inverse U-shaped curve."** [Strongly indicative of a hormonal effect.] "The reference concentration of 0.135% methionine yielded the longest lived flies. Restricting methionine intake to one third this amount (0.045%) decreased mean lifespan by 1.95%, top quartile lifespan by 2.53% and median lifespan by 4.0%, with no effect on the bottom quartile. Increasing methionine intake to three times this amount (0.405%) was more harmful, limiting maximal lifespan by 2.33% compared to the reference diet and curtailing longevity across all ages. High methionine decreased maximum lifespan by only 2.33%, however it decreased mean lifespan by 9.55% from 71.72 to 64.87 days, compared to flies fed the reference diet. Furthermore, high methionine decreased lifespan by 8.86% for flies in the top quartile, 9.33% for flies with median lifespan and by 10.29% for flies in the bottom quartile. All changes were statistically significant."

[17] Stubbs AK, Wheelhouse NM, Lomax MA, Hazlerigg DG. Nutrient-hormone interaction in the ovine liver: methionine supply selectively modulates growth hormone-induced IGF-I gene expression. J Endocrinol. 2002;174:335–341. "These results indicate that methionine is the key limiting amino acid involved in the modulation of IGF-I expression in the ovine liver. This nutrient-hormone interaction is a highly selective phenomenon, occurring against a background of modest effects on general protein synthetic control."

[18] Miller, R. A., Buehner, G., Chang, Y., Harper, J. M., Sigler, R., & Smith-Wheelock, M. (2005). Methionine-deficient diet extends mouse lifespan, slows immune and lens aging, alters glucose, T4, IGF-I and insulin levels, and increases hepatocyte MIF levels and stress resistance. *Aging cell*, *4*(3), 119-125. "Mice in the Meth-R group are significantly lower in serum IGF-I, and thyroxine (T4) levels. Serum insulin is approximately 25% of controls, and fasting glucose is reduced by about 50%. Differences between groups are significant at $P < 0.01$ for all four measures."

[19] Orentreich N, Matias JR, DeFelice A, Zimmerman JA. Low methionine ingestion by rats extends life span. J Nutr. 1993;123:269–274. Caro, P., Gómez, J., López-Torres, M., Sánchez, I., Naudí, A., Jove, M., ... & Barja, G. (2008). Forty percent and eighty percent methionine restriction decrease mitochondrial ROS generation and oxidative stress in rat liver. *Biogerontology*, *9*(3), 183-196. "The results show that 40% isocaloric MetR [methionine restriction] is enough to decrease ROS [reactive oxygen species] production and oxidative stress in rat liver. This suggests that the lowered intake of methionine is responsible for the decrease in oxidative stress observed in DR [dietary restriction]."

[20] Zhang and Li, 2010: *Effect of dietary methionine on growth performance and insulin-like growth factor-I mRNA expression of growing meat rabbits.*

[21] Brown-Borg, H. M., Rakoczy, S. G., Wonderlich, J. A., Rojanathammanee, L., Kopchick, J. J., Armstrong, V., & Raasakka, D. (2014). Growth hormone signaling is necessary for lifespan extension by dietary methionine. *Aging cell*, *13*(6), 1019-1027.

[22] Ables, G. P., Brown-Borg, H. M., Buffenstein, R., Church, C. D., Elshorbagy, A. K., Gladyshev, V. N., … Orentreich, N. (2014). The First International Mini-Symposium on Methionine Restriction and Lifespan. *Frontiers in Genetics*, *5*, 122. doi:10.3389/fgene.2014.00122.

misleading. The "deficiency" can only be measured against some norm or goal. If the goal is long life and freedom from oxidative stress, then the norm is different from that defined by a goal of maximum growth. A level that is "excessive" with respect to one norm may be "adequate" with respect to the other. Regardless of the goal, manipulating methionine in the diet through additions of synthetic methionine is, as Dr. Goldstein points out, effectively using a synthetic growth promoter and is comparable to the use of rBGH to enhance milk production.

In a letter submitted to the LS in response to Dr. Goldstein, Dr. Jacquie Jacob dismisses most of the studies cited by Dr. Goldstein because they "compared diets deficient or adequate in methionine levels." In this case "deficient" and "adequate" are measured against a norm of growth promotion. When taken in the broader context, however, that terminology becomes misleading. Whether or not it makes sense within the context of nonorganic, chemical-intensive agriculture, it does not make sense within the organic context, which does not permit the use of synthetic growth promoters. Within the organic context, the norm must be growth achievable through natural means, using management practices consistent with organic principles.

In view of these facts, it would be wise to take into consideration the prohibition in OFPA against the use of growth promoters and hormones in livestock,[23] as well as the strong consumer reaction against rGBH/BST use in dairy cows.

The claim that "Overall usage of MET will likely be lowered" is not supported by research or proposed feeding schedules.

The MTF has not provided feeding schedules to show how the methionine will be used over the life of the bird in a way that averages out to the numbers in the petition. There is one respect, however, in which the overall usage of methionine will certainly be raised under the proposal – that is because the cap on methionine in feed for broilers will be raised from **2.0** pounds per ton to an average of **2.5** pounds per ton. Furthermore, there are a number of assumptions that must be made in calculating the overall usage under an averaging system –the total feed consumption per bird at each lifestage, for how many lifestages rations will be developed, and how much synthetic methionine will be provided in each. Since the later life stages –at least for broilers—require less methionine, but consume more food, the amount of synthetic methionine in the starter ration can be quite high –perhaps as much as 2-4 times the limit of 2.5 pounds per ton. For the sake of transparency, the MTF and the LS should supply some examples showing how the rations will be balanced over the lifetime of the birds.[24]

Reversal of a Previous NOSB Decision

In past decisions, the NOSB was very clear that it wants to institute a step-down process, which it did using expiration dates. The expiration dates sent an important message that the board is

[23] §6509(c)(3).

[24] For example, assuming a growing (days 22-38) ration with 0.06% MET and a finishing (days 38-54) ration of 0.03% MET would allow the starter ration (days 1-21) to be as high as 0.55% (11 pounds per ton.) This assumes a feed intake as recommended by the NRC and life stage divisions for fast-growing broilers as cited in an example in Fanatico, A., 2010. Organic Poultry Production: Providing Adequate Methionine, p. 14.

serious about moving away from this allowed material. Logistically, it allowed the NOSB to accomplish the step down by changing allowed rates of methionine in the absence of the ability to annotate at sunset. The move back to a sunset came after the NOSB policy change allowed annotations at sunset. The current majority proposal reverses a previous board decision without presenting substantive new scientific information that reviews a variety of approaches to poultry management and other feed sources that are scientifically verifiable. In doing so, it approves a petition that had been previously turned down, without substantive new information. As NOP has stated on numerous occasions to the NOSB, reversing a previous board decision requires new information that is based in science. Individual testimonials are not sufficient basis for a reversal.

An expiration date is needed.

If, as the resolution in the majority proposal states, the NOSB is committed to a phase-out of synthetic methionine, then it is essential that an expiration date be attached. The expiration date is the only way to incentivize alternative practices and products. Otherwise, the process under the NOP-mandated sunset process assumes continued use unless a decisive 2/3's vote of the board removes the materials from the National List. Without an expiration date under the new sunset policy, it would require a petition to effect the changes required by a step-down. Therefore, we suggest that the listing be changed to read:

> DL–Methionine, DL–Methionine—hydroxy analog, and DL–Methionine—hydroxy analog calcium (CAS #'s 59-51-8, 583-91-5, 4857-44-7, and 922-50-9)——for use only in organic poultry production at the following pounds of synthetic 100% Methionine per ton of feed in the diet, averaged over the life of the flock: Laying and broiler chickens – 2 pounds; Turkeys and all other poultry – 3 pounds. Until December 31, 2019.

Conclusion

The will of past boards –and of the current Livestock Subcommittee as stated in its proposed resolution—cannot be effected without an expiration date. We urge the NOSB to reject any proposal that does not include an expiration date. We also urge the NOSB to deny any petition that expands the use of methionine at any growth stage.

Thank you for your consideration of these comments.

Sincerely,

Terry Shistar, Ph.D.
Board of Directors