



PERFORMANCE MINERALS®

## 26 Peer Reviewed Publications DAIRY

1. **Kincaid, R.L. and M.T. Socha. 2007.** Effect of cobalt supplementation during late gestation and early lactation on milk and serum measures. *J. Dairy Sci.* 90:1880-1886.
2. **Nocek, J. E., M. T. Socha and D. J. Tomlinson. 2006.** The effect of trace mineral fortification level and source on performance of dairy cattle. *J. Dairy Sci.* 89:2679-2693.
3. **Drendel, T. R., P. C. Hoffman, N. R. St.Pierre, M. T. Socha, D. J. Tomlinson and T. L. Ward. 2005.** Effects of feeding zinc, manganese, and copper amino acid complexes and cobalt glucoheptonate to dairy replacement heifers on claw disorders. *The Professional Animal Scientist* 21:217-224.
4. **Kinal, S., A. Korniewicz, D. Jamroz, R. Zieminski and M. Slupcznska. 2005.** Dietary effects of zinc, copper and manganese chelates and sulphates on dairy cows. *Journal of Food, Agriculture & Environment* 3:168-172.
5. **Smith, K. L., M. R. Waldron, J. K. Drackley, M. T. Socha and T. R. Overton. 2005.** Performance of dairy cows as affected by prepartum dietary carbohydrate source and supplementation with chromium throughout the transition period. *J. Dairy Sci.* 88:255-263
6. **Weiss, W. P. and M. T. Socha. 2005.** Dietary manganese for dry and lactating Holstein cows. *J. Dairy Sci.* 88:2517-2523.
7. **Bryan, M. A., M. T. Socha and D. J. Tomlinson. 2004.** Supplementing intensively grazed late-gestation and early-lactation dairy cattle with chromium. *J. Dairy Sci.* 87:4269-4277.

8. **Kellogg, D. W., D. J. Tomlinson, M. T. Socha and A. B. Johnson. 2004.** Effects of zinc methionine complex on milk production and somatic cell count of dairy cows: twelve-trial summary. *The Professional Animal Scientist* 20:295-301.
9. **Kincaid, R. L. and M. T. Socha. 2004.** Inorganic versus complexed trace mineral supplements on performance of dairy cows. *The Professional Animal Scientist* 20:66-73.
10. **Kellogg, D. W., M. T. Socha, D. J. Tomlinson and A. B. Johnson. 2003.** Effects of feeding cobalt glucoheptonate and metal specific amino acid complexes of zinc, manganese, and copper on lactation and reproductive performance of dairy cows. *The Professional Animal Scientist* 19:1-9.
11. **Kincaid, R., L. Lefebvre, J. D. Cronrath, M. T. Socha and A. B. Johnson. 2003.** Effect of dietary cobalt supplementation on cobalt metabolism and performance of dairy cattle. *J. Dairy Sci.* 86:1405-1414.
12. **Arrayet, J. L., A. M. Oberbauer, T. R. Famula, I. Garnett, J. S. Oltjen, J. Imhoof, M. E. Kehrl Jr., and T. W. Graham. 2002.** Growth of Holstein calves born birth to 90 days: The influence of dietary zinc and BLAD status. *J. Anim. Sci.* 80:545-552.
13. **Ballantine, H. T., M. T. Socha, D. J. Tomlinson, A. B. Johnson, A. S. Fielding, J. K. Shearer and S. R. Van Amstel. 2002.** Effects of feeding complexed zinc, manganese, copper and cobalt to late gestation and lactating dairy cows on claw integrity, reproduction and lactation performance. *The Professional Animal Scientist* 18:211-218.
14. **Yost, G.P., J.D. Arthington, L.R. McDowell, F.G. Martin, N.S. Wilkinson and C.K. Swenson. 2002.** Effect of copper source and level on the rate and extent of copper repletion in Holstein heifers. *J. Dairy Sci.* 85:3297-3303.
15. **Hayiril, A., D. R. Bremmer, S. J. Bertics, M. T. Socha and R. R. Grummer. 2001.** Effect of chromium supplementation on production and metabolic parameters in periparturient dairy cows. *J. Dairy Sci.* 84:1218-1230.
16. **Uchida, K., P. Mandevu, C. S. Ballard, C. J. Sniffen and M. P. Carter. 2001.** Effect of feeding a combination of zinc, manganese and copper amino acid complexes and cobalt glucoheptonate on performance of early lactation high producing dairy cows. *Anim. Feed Sci. Technol.* 93:193.
17. **Chase, C. R., D. K. Beede, H. H. Van Horn, J. K. Shearer, C. J. Wilcox and G. A. Donovan. 2000.** Responses of lactating dairy cows to copper supplementation rate and dietary antagonist (iron). *J. Dairy Sci.* 83:1845-1852.

18. **Nocek, J. E., A. B. Johnson and M. T. Socha. 2000.** Digital characteristics in commercial dairy herds fed metal-specific amino acid complexes. *J. Dairy Sci.* 83:1553-1572.
19. **Campbell, M. H., J. K. Miller and F. N. Schrick. 1999.** Effect of additional cobalt, copper, manganese, and zinc on reproduction and milk yield of lactating dairy cows receiving bovine somatotrophin. *J. Dairy Sci.* 82:1019-1025.
20. **Smith, M. B., H. E. Amos and M. A. Froethschel. 1999.** Influence of ruminally undegraded protein and zinc methionine on milk production, hoof growth and composition, and selected plasma metabolites of high producing dairy cows. *The Professional Animal Scientist* 15:268-277.
21. **Campbell, M. H. and J. K. Miller. 1998.** Effect of supplemental dietary vitamin E and zinc on reproductive performance of dairy cows and heifers fed excess iron. *J. Dairy Sci.* 81:2693-2699.
22. **Kincaid, R. L., B. P. Chew and J. D. Cronrath. 1997.** Zinc oxide and amino acids as sources of dietary zinc for calves: Effects on uptake and immunity. *J. Dairy Sci.* 80:1381-1388.
23. **Graham, T. W., M. C. Thurmond, M. E. Gershwin, J. P. Picanso, J. S. Garvey and C. L. Keen. 1994.** Serum zinc and copper concentrations in relation to spontaneous abortion in cows: Implications for human fetal loss. *J. Reprod. Fertility.* 102:253-262.
24. **Kincaid, R. L. and J. D. Cronrath. 1993.** Effects of added dietary fat and amino acids on performance of lactating cows. *J. Dairy Sci.* 76:1601-1606.
25. **Kellogg, D. W., J. M. Rakes and D. W. Gliedt. 1989.** Effects of zinc methionine supplementation on performance and selected blood parameters of lactating dairy cows. *Nutr. Rep. Int.* 40: 1049-1057.
26. **Moore, C. L., P. M. Walker, J. R. Winter, M. A. Jones and J. W. Webb. 1989.** Zinc methionine supplementation for dairy cows. *Transactions of the Illinois State Academy of Science* 82:99-108.



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## 32 Peer Reviewed Publications BEEF

1. **Dorton, K.L., T.E. Engle, R.M. Enns and J.J. Wagner. 2007.** Effects of trace mineral supplementation, source, and growth implants on immune response of growing and finishing feedlot steers. *The Professional Animal Scientist* 23:29-35
2. **Whitman, K.J., T.E. Engle, P.D. Burns, K.L. Dorton, J.K. Ahola, R.M. Enns and T.L. Stanton. 2007.** Effects of copper and zinc source on performance, carcass characteristics, and lipid metabolism in finishing steers. *The Professional Animal Scientist* 23:36-41
3. **Dorton, K. L., T. E. Engle and R. M. Enns. 2006.** Effects of trace mineral supplementation and source, 30 days post-weaning and 28 days post receiving, on performance and health of feeder cattle. *Asian-Aust. J. Anim. Sci.* 19:1450-1454.
4. **Arthington, J. D. and C. K. Swenson. 2004.** Effects of trace mineral source and feeding method on the productivity of grazing Braford cows. *The Professional Animal Scientist* 20:1-7.
5. **Arthington, J. D., F. M. Pate and J. W. Spears. 2003.** Effect of copper source and level on performance and copper status of cattle consuming molasses-based supplements. *J. Anim. Sci.* 81:1357-1362.
6. **Arthington, J. D., F. G. Martin and F. Blecha. 2003.** Effect of molybdenum and sulfur feeding on the acute phase protein response to inflammatory challenge in beef heifers. *The Professional Animal Scientist* 19:221-226.
7. **Dorton, K. L., T. E. Engle, D. W. Hamar, P. D. Siciliano and R. S. Yemm. 2003.** Effects of copper source and concentration on copper status and immune function in growing and finishing steers. *Animal Feed Science and Technology* 110:31-44.

8. **Johnson, L. R. and T. E. Engle. 2003.** The effects of copper source and concentration on lipid metabolism in growing and finishing angus steers. *Asian-Aust. J. Anim. Sci.* 8:1131-1136.
9. **Rhoad, A.R., T. L. Stanton, T. E. Engle and C. V. Kimberling. 2003.** Effects of concentration and source of trace minerals on performance, immunity, mineral and lipid metabolism, and carcass characteristics of beef steers. *The Professional Animal Scientist* 19:150-158.
10. **Huerta, M., R. L. Kincaid, J. D. Cronrath, J. Busboom, A. B. Johnson and C. K. Swenson. 2002.** Interaction of dietary zinc and growth implants on weight gain, carcass traits and zinc in tissues of growing beef steers and heifers. *Animal Feed Science and Technology* 95:15-32.
11. **Lee, S. H., T. E. Engle and K. L. Hossner. 2002.** Effects of dietary copper on the expression of lipogenic genes and metabolic hormones in steers. *J. Anim. Sci.* 80:1999-2005.
12. **Bailey, J. D., R. P. Ansotegui, J. A. Paterson, C. K. Swenson and A. B. Johnson. 2001.** Effects of supplementing combinations of inorganic and complexed copper on performance and liver mineral status of beef heifers consuming antagonists. *J. Anim. Sci.* 79:2926-2934.
13. **Chirase, N. K. and L. W. Greene. 2001.** Dietary zinc and manganese sources administered from the fetal stage onwards affect immune response of transit stressed and virus infected offspring steer calves. *Animal Feed Science and Technology* 93:217-228.
14. **Grotelueschen, D. M., A. Wohlers, C. E. Dewey, I. G. Rush, W. E. Braselton, Jr., D. Hamar, A. B. Johnson and J. H. Pollreis. 2001.** Effect of pasture trace mineral supplementation on liver mineral levels and feedlot morbidity and mortality. *The Bovine Practitioner* 35:73-84.
15. **Muehlenbein, E. L., D. R. Brink, G. H. Deutscher, M. P. Carlson and A. B. Johnson. 2001.** Effects of inorganic and organic copper supplemented to first-calf cows on cow reproduction and calf health and performance. *J. Anim. Sci.* 79:1650-1659.
16. **Kegley, E. B., D. Galloway and T. M. Fakler. 2000.** Effect of dietary chromium-L-methionine on glucose metabolism of beef steers. *J. Anim. Sci.* 78:3177-3183.
17. **Stanton, T. L., J. C. Whittier, T. W. Geary, C. V. Kimberling and A. B. Johnson. 2000.** Effects of trace mineral supplementation on cow-calf performance, reproduction, and immune function. *The Professional Animal Scientist* 16:121-127.

18. **Olson, P. A., D. R. Brink, D. T. Hickok, M. P. Carlson, N. R. Schneider, G. H. Deutscher, D. C. Adams, D. J. Colburn and A. B. Johnson. 1999.** Effects of supplementation of organic and inorganic combinations of copper, cobalt, manganese, and zinc above nutrient requirement levels on postpartum two-year-old cows. *J. Anim. Sci.* 77:522-532.
19. **Rabiansky, P.A., L. R. McDowell, J. Velasquez-Pereira, N. S. Wilkinson, S. S. Percival, F. G. Martin, D. B. Bates, A. B. Johnson, T. R. Batra and E. Salgado-Madriz. 1999.** Evaluating copper lysine and copper sulfate sources for heifers. *J. Dairy Sci.* 82:2642-2650.
20. **Engle, T. E., C. F. Nockels, C. V. Kimberling, D. L. Weaber and A. B. Johnson. 1997.** Zinc repletion with organic or inorganic forms of zinc and protein turnover in marginally zinc-deficient calves. *J. Anim. Sci.* 75:3074-3081.
21. **Engle, T. E., C. F. Nockels, K. L. Hossner, C. V. Kimberling, R. E. Toombs, R. S. Yemm, D. L. Weaber and A. B. Johnson. 1997.** Marginal zinc deficiency affects biochemical and physiological parameters in beef heifer calves. *Asian-Australian Journal of Animal Sciences* 10:471-477.
22. **George, M. H., C. F. Nockels, T. L. Stanton and A. B. Johnson. 1997.** Effect of source and amount of zinc, copper, manganese and cobalt fed to stressed heifers on feedlot performance and immune function. *The Professional Animal Scientist* 13:84-89.
23. **Rojas, L. X., L. R. McDowell, F. G. Martin, N. S. Wilkinson, A. B. Johnson and C. A. Njeru. 1996.** Relative bioavailability of zinc methionine and two inorganic zinc sources fed to cattle. *J. Trace Elem. Med. Biol.* 10(4):205-209.
24. **Chirase, N. K., D. P. Hutcheson, G. B. Thompson and J. W. Spears. 1994.** Recovery rate and plasma zinc and copper concentrations of steer calves fed organic and inorganic zinc and manganese sources with or without injectable copper and challenged with infectious bovine rhinotracheitis virus. *J. Anim. Sci.* 72:212-219.
25. **Kegley, E. B. and J. W. Spears. 1994.** Bioavailability of feed-grade copper sources (oxide, sulfate or lysine) in growing cattle. *J. Anim. Sci.* 72:2728-2734.
26. **Brazle, F.K. 1994.** The effect of zinc methionine in a mineral mixture on gain and incidence of footrot in steers grazing native grass pastures. *The Professional Animal Scientist* 10:169-171.
27. **Nockels, C. F., J. DeBonis and J. Torrent. 1993.** Stress induction affects copper and zinc balance in calves fed organic and inorganic copper and zinc sources. *J. Anim. Sci.* 71:2539-2549.
28. **Ward, J. D. and J. W. Spears. 1993.** Comparison of copper lysine and copper sulfate as copper sources for ruminants using *in vitro* methods. *J. Dairy Sci.* 76:2994-2998.

29. **Ward, J. D., J. W. Spears and E. B. Kegley. 1993.** Effect of copper level and source (copper lysine vs copper sulfate) on copper status, performance, and immune response in growing steers fed diets with or without supplemental molybdenum and sulfur. *J. Anim. Sci.* 71:2748-2755.
30. **Chirase, N. K., D. P. Hutcheson and G. B. Thompson. 1991.** Feed intake, rectal temperature, and serum mineral concentrations of feedlot cattle fed zinc oxide or zinc methionine and challenged with infectious bovine rhinotracheitis virus. *J. Anim. Sci.* 69:4137-4145.
31. **Spears, J. W., R. W. Harvey and T. T. Brown. 1991.** Effects of zinc methionine and zinc oxide on performance, blood characteristics, and antibody titer response to viral vaccination in stressed feeder calves. *JAVMA* 199:1731-1733.
32. **Greene, L. W., D. K. Lunt, F. M. Byers, N. K. Chirase, C. E. Richmond, R. E. Knutson and G. T. Schelling. 1988.** Performance and carcass quality of steers supplemented with zinc oxide or zinc methionine. *J. Anim. Sci.* 66:1818-1823.



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## 22 Peer Reviewed Publications POULTRY

1. **Barber, S. J., H. M. Parker and C. D. McDaniel. 2005.** Broiler breeder semen quality as affected by trace minerals in vitro. *Poultry Science* 84:100-105.
2. **Tako, E., P. Ferket and Z. Uni. 2005.** Changes in chicken intestinal zinc exporter mRNA expression and small intestinal functionality following intra-amniotic zinc-methionine administration. *J. Nutritional Biochemistry* 16:339-346.
3. **Burrell, A. L., W. A. Dozier, III, A. Davis, M. M. Compton, M. E. Freeman, P. F. Vendrell and T. L. Ward. 2004.** Responses of broilers to dietary zinc concentrations and sources in relation to environmental implications. *British Poultry Science* 45:255-263.
4. **Hudson, B. P., B. D. Fairchild, J. Wilson, W. A. Dozier, III, and R. J. Buhr. 2004.** Breeder age and zinc source in broiler breeder hen diets on progeny characteristics at hatching. *J. Appl. Poult. Res.* 13:55-64.
5. **Hudson, B. P., W. A. Dozier, III, J. Wilson, J. E. Sander and T. L. Ward. 2004.** Reproductive performance and immune status of caged broiler breeder hens provided diets supplemented with either inorganic or organic sources of zinc from hatching to 65 wk of age. *J. Appl. Poult. Res.* 13 :349-359.
6. **Hudson, B. P., W. A. Dozier, III, B. D. Fairchild, J. Wilson, J. E. Sander, and T. L. Ward. 2004.** Live performance and immune responses of straight-run broilers: influence of zinc sources in broiler breeder hen and progeny diets and ambient temperature during the broiler production period. *J. Appl. Poult. Res.* 13:291-301.
7. **Viriden, W. S., J. B. Yeatman, S. J. Barber, K. O. Willeford, T. L. Ward, T. M. Fakler, R. F. Wideman and M. T. Kidd. 2004.** Immune system and cardiac functions of progeny chicks from dams fed diets differing in zinc and manganese level and source. *Poult. Sci* 83:344-351.

8. **Dozier, W. A., III, A. J. Davis, M. E. Freeman and T. L. Ward. 2003.** Early growth and environmental implications of dietary zinc and copper concentrations and sources of broiler chicks. *British Poultry Science* 44:726-731.
9. **Mabe, I., C. J. Rapp, M. M. Bain and Y. Nys. 2003.** Supplementation of a corn-soybean meal diet with manganese, copper and zinc from organic or inorganic sources improves eggshell quality in aged laying hens. *Poultry Science* 82:1903-1913.
10. **Viriden, W. S., J. B. Yeatman, S. J. Barber, C. D. Zumwalt, T. L. Ward, A. B. Johnson and M. T. Kidd. 2003.** Hen mineral nutrition impacts progeny livability. *J. Appl. Poult. Res.* 12:411-416.
11. **Chen, J. and D. Balnave. 2001.** The influence of drinking water containing sodium chloride on performance and eggshell quality of a modern colored layer strain. *Poultry Science* 80:91-94.
12. **Hess, J. B, S. F. Bilgili, A. M. Parson and K. M. Downs. 2001.** Influence of complexed zinc products on live performance and carcass grade of broilers. *J. Appl. Anim. Res.* 19:49-60.
13. **Swiatkiewicz, S., J. Koreleski and D. Q. Zhong. 2001.** The bioavailability of zinc from inorganic and organic sources in broiler chickens as affected by addition of phytase. *Journal of Animal and Feed Sciences* 10:317-328.
14. **Downs, K. M., J. B. Hess, K. S. Macklin and R. A. Norton. 2000.** Dietary zinc complexes and vitamin E for reducing cellulitis incidence in broilers. *J. Appl. Poultry Res.* 9:319-323.
15. **Kidd, M. T., P. R. Ferket and M. A. Qureshi. 1996.** Zinc metabolism with special reference to its role in immunity. *World's Poultry Science Journal* 52:309-324.
16. **Kidd, M. T., M. A. Qureshi, P. R. Ferket and L. N. Thomas. 1994.** Blood clearance of *Escherichia coli* and evaluation of mononuclear-phagocytic system as influenced by supplemental dietary zinc methionine in young turkeys. *Poultry Science* 73:1381-1389.
17. **Aoyagi, S. and D. H. Baker. 1993.** Nutritional evaluation of copper-lysine and zinc-lysine complexes for chicks. *Poultry Science* 72:165-71.
18. **Kidd, M. T., N. B. Anthony and S. R. Lee. 1992.** Progeny performance when dams and chicks are fed supplemental zinc. *Poultry Science* 71:1201-1206.
19. **Wedekind, K. J., A. E. Hortin and D. H. Baker. 1992.** Methodology for assessing zinc bioavailability: efficacy estimates for zinc-methionine, zinc sulfate, and zinc oxide. *J. Anim. Sci.* 70:178-187.

20. **Moreng, R. E., D. Balnave and D. Zhang. 1992.** Dietary zinc methionine effect on eggshell quality of hens drinking saline water. *Poultry Science* 71:1163-1167.
21. **Baker, D. H., J. Odle, M. A. Funk and T. M. Wieland. 1991.** Bioavailability of copper in cupric oxide, cuprous oxide, and in copper-lysine complex. *Poultry Science* 70:177-179.
22. **Scheideler, S. E. 1991.** Interaction of dietary calcium, manganese and manganese source (Mn oxide or Mn methionine complex) on chick performance and manganese utilization. *Biological Trace Element Research* 29:217-228.



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## 21 Peer Reviewed Publications SWINE

1. **Apple, J.K., W.A. Wallis-Phelps, C.V. Maxwell, L.K. Rakes, J.T. Sawyer, S. Hutchison, and T. M. Fakler. 2007.** Effect of supplemental iron on finishing swine performance, carcass characteristics, and pork quality during retail display. *J. Anim. Sci.* 85:737-745
2. **Payne, R. L., T. D. Bidner, T. M. Fakler and L. L. Southern. 2006.** Growth and intestinal morphology of pigs from sows fed two zinc sources during gestation and lactation. *J. Anim. Sci.* 84:2141-2149.
3. **Hollis, G. R., S. D. Carter, T. R. Cline, T. D. Crenshaw, G. L. Cromwell, G. M. Hill, S. W. Kim, A. J. Lewis, D. C. Mahan, P. S. Miller, H. H. Stein and T. L. Veum. 2005.** Effects of replacing pharmacological levels of dietary zinc oxide with lower dietary levels of various organic zinc sources for weanling pigs. *J. Anim. Sci.* 83:2123-2129.
4. **Washburn, K. E., J. G. Powell, C. V. Maxwell, E. B. Kegley, Z. B. Johnson and T. M. Fakler. 2005.** A successful method of obtaining percutaneous liver biopsy samples of sufficient quantity for trace mineral analysis in adult swine without the aid of ultrasound. *Journal of Swine Health & Production* 13:126-130.
5. **Wei, K.Q., Z.R. Xu, X.G. Luo, L.L. Zeng, W. Chen and T.M. Fakler. 2005.** Effects of iron from an amino acid complex on the iron status of neonatal and suckling piglets. *Asian-Aust. J. Anim. Sci.* 2005. 18:1485-1491
6. **Apple, J.K., W.J. Roberts, C.V. Maxwell, C.B. Boger, K.G. Friesen, L.K. Rakes and T.M. Fakler. 2005.** Influence of dietary manganese source and supplementation level on pork quality during retail display. *Journal of Muscle Foods* 16:207-222

7. **Apple, J. K., W. J. Roberts, C. V. Maxwell, C. B. Boger, T. M. Fakler, K. G. Friesen and Z. B. Johnson. 2004.** Effect of supplemental manganese on performance and carcass characteristics of growing-finishing swine. *J. Anim. Sci.* 82:3267-3276.
8. **Chen, W., Q. Guo, X. Luo, K. Wei, T.M. Fakler, Y. Lin, R. Pan, L. Lu, B. Liu. 2004.** Effect of iron-amino acid complex on reproductive performance of sows, and growth and skin color of nursing piglets. *Acta Zoonutrimenta Sinica* 16:30-35
9. **Zeng, L, W. Chen, X Luo, K. Wei, T.M. Fakler, Y. Lin, R. Pan, L. Lu, B.Liu. 2003.** Effect of dietary iron-amino acid complex on iron status of neonatal and nursing piglets. *Acta Veterinaria et Zootechnica Sinica* 34:1-8
10. **Van Heugten, E., J. W. Spears, E. B. Kegley, J. D. Ward and M. A. Qureshi. 2003.** Effects of organic forms of zinc on growth performance, tissue zinc distribution, and immune response of weanling pigs. *J. Anim. Sci.* 81:2063-2071.
11. **Kegley, E. B., J. W. Spears, W. L. Flowers and W. D. Schoenherr. 2002.** Iron methionine as a source of iron for the neonatal pig. *Nutrition Research* 22:1209-1217.
12. **Yu, B., W. J. Huang and P.W.S. Chiou. 2000.** Bioavailability of iron from amino acid complex in weanling pigs. *Animal Feed Science and Technology* 86: 39-52.
13. **Cheng, J., E. T. Kornegay and T. C. Schell. 1998.** Influence of dietary lysine on the utilization of zinc from zinc sulfate and a zinc-lysine complex by young pigs. *J. Anim. Sci.* 76:1064-1074.
14. **Apgar, G. A. and E. T. Kornegay. 1996.** Mineral Balance of finishing pigs fed copper sulfate or a copper-lysine complex. *J. Anim. Sci.* 74:1594-1600.
15. **Schell, T. C. and E. T. Kornegay. 1996.** Zinc concentration in tissues and performance of weanling pigs fed pharmacological levels of zinc from ZnO, Zn-methionine, Zn-lysine, or ZnSO<sub>4</sub>. *J. Anim. Sci.* 74:1584-1593.
16. **Apgar, G. A., E. T. Kornegay, M. D. Lindemann and D. R. Notter. 1995.** Evaluation of copper sulfate and a copper lysine complex as growth promoters for weanling swine. *J. Anim. Sci.* 73:2640-2646.
17. **Coffey R. D., G. L. Cromwell and H. J. Monegue. 1994.** Efficacy of a copper-lysine complex as a growth promotant for weanling pigs. *J. Anim. Sci.* 72: 2880-2886.
18. **Wedekind, K. J., A. J. Lewis, M. A. Giesemann and P. S. Miller. 1994.** Bioavailability of zinc from inorganic and organic sources for pigs fed corn-soybean meal diets. *J. Anim. Sci.* 72:2681-2689.

19. **Zhou, W., E. T. Kornegay, H. van Laar, J.W.G.M. Swinkels, E. A. Wong and M. D. Lindemann. 1994.** The role of feed consumption and feed efficiency in copper stimulated growth. *J. Anim. Sci* 72: 2385-2394.
20. **Hahn, J. D. and D. H. Baker. 1993.** Growth and plasma zinc responses of young pigs fed pharmacologic levels of zinc. *J. Anim. Sci.* 71:3020-3024.
21. **Hill, D. A., E. R. Peo, Jr., A. J. Lewis and J. D. Crenshaw. 1986.** Zinc amino acid complexes for swine. *J. Anim. Sci.* 63:121-130.



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## 2 Peer Reviewed Publication EQUINE

1. **Richardson, S.M., P. D. Siciliano, T. E. Engle, C. K. Larson and T. L. Ward. 2006.** Effect of selenium supplementation and source on the selenium status of horses. *J. Anim. Sci.* 84:1742-1748.
2. **Naile, T.L., S.R. Cooper, D.W. Freeman, and C.R. Krehbiel. 2005.** Effects of mineral source on growth and balance in yearling horses. *The Professional Animal Scientist* 21:121-127.



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## 9 Peer Reviewed Publications SHEEP and GOATS

1. **Hatfield, P. G., B. L. Robinson, D. L. Minikhiem, R. W. Kott, N. I. Roth, J. T. Daniels and C. K. Swenson. 2002.** Serum  $\alpha$ -tocopherol and immune function in yearling ewes supplemented with zinc and vitamin E. *J. Anim. Sci.* 80:1329-1334.
2. **Hatfield, P. G., C. K. Swenson, R. W. Kott, R. P. Ansotegui, N. I. Roth and B. L. Robinson. 2001.** Zinc and copper status in ewes supplemented with sulfate- and amino acid-complexed forms of zinc and copper. *J. Anim. Sci.* 79:261-266.
3. **Puchala, R., T. Sahlu and J. J. Davis. 1999.** Effects of zinc methionine on performance of Angora goats. *Small Ruminant Research* 33:1-8.
4. **Berrie, R. A., D. M. Hallford and M. L. Galyean. 1995.** Effects of zinc source and level on performance, carcass characteristics, and metabolic hormone concentrations of growing and finishing lambs. *The Professional Animal Scientist* 11:149-156.
5. **Hatfield, P. G., G. D. Snowder, W. A. Head, Jr., H. A. Glimp, R. H. Stobart and T. Besser. 1995.** Production by ewes rearing single or twin lambs: Effects of dietary crude protein percentage and supplemental zinc methionine. *J. Anim. Sci.* 73:1227-1238.
6. **Kegley, E. B. and J. W. Spears. 1995.** Immune response and performance of sheep fed supplemental zinc as zinc oxide or zinc methionine. *Sheep & Goat Research Journal* 11:127-131.
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## **3 Peer Reviewed Publications AQUACULTURE**

1. **Sealey, W.M., C. Lim and P.H. Klesius. 1997.** Influence of the dietary level of iron from iron methionine and iron sulfate on immune response and resistance of channel catfish to *Edwardsiella ictaluri*. *Journal of the World Aquaculture Society* 28:142-149.
2. **Paripatananont, T. and R.T. Lovell. 1995.** Responses of channel catfish fed organic and inorganic sources of zinc to *Edwardsiella ictaluri* challenge. *Journal of Aquatic Animal Health* 7:147-154.
3. **Paripatananont, T. and R.T. Lovell. 1995.** Chelated zinc reduces the dietary zinc requirement of channel catfish, *Ictalurus punctatus*. *Aquaculture* 33:73-82