

Supplementary Materials: List of references used for the meta-analysis

1. Allen, D.M.; Grant, R.J. Interactions between forage and wet corn gluten feed as sources of fiber in diets for lactating dairy cows. *J. Dairy Sci.* **2000**, *83*, 322–331, doi:10.3168/jds.S0022-0302(00)74882-X.
2. AlZahal, O.; Or-Rashid, M.M.; Greenwood, S.L.; Douglas, M.S.; McBride, B.W. The effect of dietary fiber level on milk fat concentration and fatty acid profile of cows fed diets containing low levels of polyunsaturated fatty acids. *J. Dairy Sci.* **2009**, *92*, 1108–1116, doi:10.3168/jds.2008-1472.
3. Bal, M.A.; Shaver, R.D.; Jirovec, A.G.; Shinnors, K.J.; Coors, J.G. Crop processing and chop length of corn silage: Effects on intake, digestion, and milk production by dairy cows. *J. Dairy Sci.* **2000**, doi:10.3168/jds.S0022-0302(00)74993-9.
4. Beauchemin, K.A.; Yang, W.Z.; Rode, L.M. Effects of particle size of alfalfa-based dairy cow diets on chewing activity, ruminal fermentation, and milk production. *J. Dairy Sci.* **2003**, *86*, 630–643, doi:10.3168/jds.S0022-0302(03)73641-8.
5. Beauchemin, K.A. Effects of dietary neutral detergent fiber concentration and alfalfa hay quality on chewing, rumen function, and milk production of dairy cows. *J. Dairy Sci.* **1991**, doi:10.3168/jds.S0022-0302(91)78499-3.
6. Boddugari, K.; Grant, R.J.; Stock, R.; Lewis, M. Maximal replacement of forage and concentrate with a new wet corn milling product for lactating dairy cows. *J. Dairy Sci.* **2001**, doi:10.3168/jds.S0022-0302(01)74545-6.
7. Chibisa, G.E.; Gorka, P.; Penner, G.B.; Berthiaume, R.; Mutsvangwa, T. Effects of partial replacement of dietary starch from barley or corn with lactose on ruminal function, short-chain fatty acid absorption, nitrogen utilization, and production performance of dairy cows. *J. Dairy Sci.* **2015**, *98*, 2627–2640, doi:10.3168/jds.2014-8827.
8. Cook, D.E.; Combs, D.K.; Doane, P.H.; Cecava, M.J.; Hall, M.B. The effects on digestibility and ruminal measures of chemically treated corn stover as a partial replacement for grain in dairy diets. *J. Dairy Sci.* **2016**, *99*, 6342–6351, doi:10.3168/jds.2015-10403.
9. Dann, H.M.; Fredin, S.M.; Cotanch, K.W.; Grant, R.J.; Kokko, C.; Ji, P.; Fujita, K. Effects of corn-based reduced-starch diets using alternative carbohydrate sources on performance of lactating Holstein cows. *J. Dairy Sci.* **2015**, *98*, 4041–4054, doi:10.3168/jds.2014-9078.
10. Dann, H.M.; Tucker, H.A.; Cotanch, K.W.; Krawczel, P.D.; Mooney, C.S.; Grant, R.J.; Eguchi, T. Evaluation of lower-starch diets for lactating Holstein dairy cows. *J. Dairy Sci.* **2014**, *97*, 7151–7161, doi:10.3168/jds.2014-8341.
11. Farmer, E.R.; Tucker, H.A.; Dann, H.M.; Cotanch, K.W.; Mooney, C.S.; Lock, A.L.; Yagi, K.; Grant, R.J. Effect of reducing dietary forage in lower starch diets on performance, ruminal characteristics, and nutrient digestibility in lactating Holstein cows. *J. Dairy Sci.* **2014**, doi:10.3168/jds.2014-7963.
12. Gencoglu, H.; Turkmen, I.I. Effects of forage source on chewing and rumen fermentation in lactating dairy cows. *Rev. Méd. Vét.* **2006**, *157*, 463–470.
13. Hassanat, F.; Gervais, R.; Julien, C.; Massé, D.I.; Lettat, A.; Chouinard, P.Y.; Petit, H. V.;

- Benchaar, C. Replacing alfalfa silage with corn silage in dairy cow diets: Effects on enteric methane production, ruminal fermentation, digestion, N balance, and milk production. *J. Dairy Sci.* **2013**, doi:10.3168/jds.2012-6480.
14. Jiang, F.G.; Lin, X.Y.; Yan, Z.G.; Hu, Z.Y.; Liu, G.M.; Sun, Y.D.; Liu, X.W.; Wang, Z.H. Effect of dietary roughage level on chewing activity, ruminal pH, and saliva secretion in lactating Holstein cows. *J. Dairy Sci.* **2017**, doi:10.3168/jds.2016-11559.
 15. Kononoff, P.J.; Heinrichs, A.J.; Lehman, H.A. The effect of corn silage particle size on eating behavior, chewing activities, and rumen fermentation in lactating dairy cows. *J. Dairy Sci.* **2003**, doi:10.3168/jds.S0022-0302(03)73937-X.
 16. Kononoff, P.J.; Heinrichs, A.J. The effect of corn silage particle size and cottonseed hulls on cows in early lactation. *J. Dairy Sci.* **2003**, doi:10.3168/jds.S0022-0302(03)73838-7.
 17. Kononoff, P.J.; Heinrichs, A.J. The effect of reducing alfalfa haylage particle size on cows in early lactation. *J. Dairy Sci.* **2003**, *86*, 1445–1457, doi:10.3168/jds.S0022-0302(03)73728-X.
 18. Krause, K.M.; Combs, D.K.; Beauchemin, K.A. Effects of forage particle size and grain fermentability in midlactation cows. I. Milk production and diet digestibility. *J. Dairy Sci.* **2002**, doi:10.3168/jds.S0022-0302(02)74270-7.
 19. Krause, K.M.; Combs, D.K.; Beauchemin, K.A. Effects of forage particle size and grain fermentability in midlactation cows. II. Ruminal pH and chewing activity. *J. Dairy Sci.* **2002**, *85*, 1947–1957, doi:10.3168/jds.S0022-0302(02)74271-9.
 20. Krause, K.M.; Combs, D.K. Effects of forage particle size, forage source, and grain fermentability on performance and ruminal pH in midlactation cows. *J. Dairy Sci.* **2003**, *86*, 1382–1397, doi:10.3168/jds.S0022-0302(03)73722-9.
 21. Le Liboux, S.; Peyraud, J.L. Effect of forage particle size and intake level on fermentation patterns and sites and extent of digestion in dairy cows fed mixed diets. *Anim. Feed Sci. Technol.* **1998**, doi:10.1016/S0377-8401(98)00123-0.
 22. Le Liboux, S.; Peyraud, J.L. Effect of forage particle size and feeding frequency on fermentation patterns and sites and extent of digestion in dairy cows fed mixed diets. *Anim. Feed Sci. Technol.* **1999**, doi:10.1016/S0377-8401(98)00220-X.
 23. Lechartier, C.; Peyraud, J.-L. The effects of forage proportion and rapidly degradable dry matter from concentrate on ruminal digestion in dairy cows fed corn silage-based diets with fixed neutral detergent fiber and starch contents. *J. Dairy Sci.* **2010**, *93*, 666–681, doi:10.3168/jds.2009-2349.
 24. Leonardi, C.; Shinnors, K.J.; Armentano, L.E. Effect of different dietary geometric mean particle length and particle size distribution of oat silage on feeding behavior and productive performance of dairy cattle. *J. Dairy Sci.* **2005**, *88*, 698–710, doi:10.3168/jds.S0022-0302(05)72734-X.
 25. Longuski, R.A.; Ying, Y.; Allen, M.S. Yeast culture supplementation prevented milk fat depression by a short-term dietary challenge with fermentable starch. *J. Dairy Sci.* **2009**, *92*, 160–167, doi:10.3168/jds.2008-0990.
 26. Maekawa, M.; Beauchemin, K.A.; Christensen, D.A. Effect of concentrate level and feeding management on chewing activities, saliva production, and ruminal pH of lactating dairy cows.

- J. Dairy Sci.* **2002**, *85*, 1165–1175, doi:10.3168/jds.S0022-0302(02)74179-9.
27. Manthey, A.K.; Kalscheur, K.F.; Garcia, A.D.; Mjoun, K. Lactation performance of dairy cows fed yeast-derived microbial protein in low- and high-forage diets. *J. Dairy Sci.* **2016**, *99*, 2775–2787, doi:10.3168/jds.2015-10014.
 28. Maulfair, D.D.; Zanton, G.I.; Fustini, M.; Heinrichs, A.J. Effect of feed sorting on chewing behavior, production, and rumen fermentation in lactating dairy cows. *J. Dairy Sci.* **2010**, *93*, 4791–4803, doi:10.3168/jds.2010-3278.
 29. Maulfair, D.D.; Heinrichs, A.J. Effects of varying forage particle size and fermentable carbohydrates on feed sorting, ruminal fermentation, and milk and component yields of dairy cows. *J. Dairy Sci.* **2013**, doi:10.3168/jds.2012-6048.
 30. Neveu, C.; Baurhoo, B.; Mustafa, A. Effect of feeding extruded flaxseed with different grains on the performance of dairy cows and milk fatty acid profile. *J. Dairy Sci.* **2014**, *97*, 1543–1551, doi:10.3168/jds.2013-6728.
 31. Oba, M.; Allen, M.S. Effects of brown midrib 3 mutation in corn silage on productivity of dairy cows fed two concentrations of dietary neutral detergent fiber: 1. Feeding behavior and nutrient utilization. *J. Dairy Sci.* **2000**, doi:10.3168/jds.S0022-0302(00)75000-4.
 32. Oba, M.; Allen, M.S. Effects of Brown Midrib 3 Mutation in Corn Silage on Productivity of Dairy Cows Fed Two Concentrations of Dietary Neutral Detergent Fiber: 2. Chewing activities. *J. Dairy Sci.* **2000**, *83*, 1350–1358, doi:10.3168/jds.S0022-0302(00)75002-8.
 33. Onetti, S.G.; Shaver, R.D.; Bertics, S.J.; Grummer, R.R. Influence of corn silage particle length on the performance of lactating dairy cows fed supplemental tallow. *J. Dairy Sci.* **2003**, *86*, 2949–57, doi:10.3168/jds.S0022-0302(03)73892-2.
 34. Penner, G.B.; Guan, L.L.; Oba, M. Effects of feeding Fermenten on ruminal fermentation in lactating Holstein cows fed two dietary sugar concentrations. *J. Dairy Sci.* **2009**, doi:10.3168/jds.2008-1706.
 35. Penner, G.B.; Oba, M. Increasing dietary sugar concentration may improve dry matter intake, ruminal fermentation, and productivity of dairy cows in the postpartum phase of the transition period. *J. Dairy Sci.* **2009**, *92*, 3341–3353, doi:10.3168/jds.2008-1977.
 36. Penner, G.B.; Beauchemin, K.A.; Mutsvangwa, T. Severity of ruminai acidosis in primiparous holstein cows during the periparturient period. *J. Dairy Sci.* **2007**, doi:10.3168/jds.S0022-0302(07)72638-3.
 37. Rustomo, B.; Alzahal, O.; Odongo, N.E.; Duffield, T.F.; McBride, B.W. Effects of rumen acid load from feed and forage particle size on ruminal pH and dry matter intake in the lactating dairy cow. *J. Dairy Sci.* **2006**, doi:10.3168/jds.S0022-0302(06)72525-5.
 38. Rustomo, B.; Alzahal, O.; Cant, J.P.; Fan, M.Z.; Duffield, T.F.; Odongo, N.E.; McBride, B.W. Acidogenic value of feeds. II. Effects of rumen acid load from feeds on dry matter intake, ruminal pH, fibre degradability and milk production in the lactating dairy cow. *Can. J. Anim. Sci.* **2006**, doi:10.4141/A04-075.
 39. San Emeterio, F.; Reis, R.B.; Campos, W.E.; Satter, L.D. Effect of coarse or fine grinding on utilization of dry or ensiled corn by lactating dairy cows. *J. Dairy Sci.* **2000**, *83*, 2839–48, doi:10.3168/jds.S0022-0302(00)75184-8.

40. Schwab, E.C.; Shaver, R.D.; Shinnors, K.J.; Lauer, J.G.; Coors, J.G. Processing and chop length effects in Brown-Midrib corn silage on intake, digestion, and milk production by dairy cows. *J. Dairy Sci.* **2002**, *85*, 613–623, doi:10.3168/jds.S0022-0302(02)74115-5.
41. Silveira, C.; Oba, M.; Yang, W.Z.; Beauchemin, K.A. Selection of barley grain affects ruminal fermentation, starch digestibility, and productivity of lactating dairy cows. *J. Dairy Sci.* **2007**, *90*, 2860–2869, doi:10.3168/jds.2006-771.
42. Sullivan, M.L.; Grigsby, K.N.; Bradford, B.J. Effects of wet corn gluten feed on ruminal pH and productivity of lactating dairy cattle fed diets with sufficient physically effective fiber. *J. Dairy Sci.* **2012**, *95*, 5213–5220, doi:10.3168/jds.2012-5320.
43. Sun, Y.; Oba, M. Effects of feeding a high-fiber byproduct feedstuff as a substitute for barley grain on rumen fermentation and productivity of dairy cows in early lactation. *J. Dairy Sci.* **2014**, doi:10.3168/jds.2013-7068.
44. Thomson, A.L.; Humphries, D.J.; Kliem, K.E.; Dittmann, M.T.; Reynolds, C.K. Effects of replacing maize silage with lucerne silage and lucerne silage chop length on rumen function and milk fatty acid composition. *J. Dairy Sci.* **2017**, doi:10.3168/jds.2017-12914.
45. Yang, W.Z.; Beauchemin, K.A.; Rode, L.M. Barley processing, forage:Concentrate, and forage length effects on chewing and digesta passage in lactating cows. *J. Dairy Sci.* **2001**, doi:10.3168/jds.S0022-0302(01)74725-X.
46. Yang, W.Z.; Beauchemin, K.A.; Rode, L.M. Barley processing, forage:concentrate, and forage length effects on chewing and digesta passage in lactating cows. *J. Dairy Sci.* **2001**, *84*, 2709–2720, doi:10.3168/jds.S0022-0302(01)74725-X.
47. Yang, W.Z.; Beauchemin, K.A. Increasing physically effective fiber content of dairy cow diets through forage proportion versus forage chop length: Chewing and ruminal pH. *J. Dairy Sci.* **2009**, doi:10.3168/jds.2008-1379.
48. Yang, W.Z.; Beauchemin, K.A. Altering physically effective fiber intake through forage proportion and particle length: Chewing and ruminal pH. *J. Dairy Sci.* **2007**, doi:10.3168/jds.2007-0032.
49. Yang, W.Z.; Beauchemin, K.A. Physically effective fiber: Method of determination and effects on chewing, ruminal acidosis, and digestion by dairy cows. *J. Dairy Sci.* **2006**, doi:10.3168/jds.S0022-0302(06)72339-6.
50. Zhang, S.Z.; Penner, G.B.; Abdelqader, M.; Oba, M. Effects of feeding alfalfa hay on chewing, rumen pH, and milk fat concentration of dairy cows fed wheat dried distillers grains with solubles as a partial substitute for barley silage. *J. Dairy Sci.* **2010**, doi:10.3168/jds.2009-3011.