|  |  |
| --- | --- |
| **Supplementary Table S1.** Publications used in the dataset | |
|  | Agle, M., A. N. Hristov, S. Zaman, C. Schneider, P. Ndegwa, and V. K. Vaddella. 2010. The effects of ruminally degraded protein on rumen fermentation and ammonia losses from manure in dairy cows. J. Dairy Sci. 93: 1625-1637. https://doi.org/10.3168/jds.2009-2579. |
|  | Alamouti, A. Asadi, M. Alikhani, G. R. Ghorbani, and Q. Zebeli. 2009. Effects of inclusion of neutral detergent soluble fibre sources in diets varying in forage particle size on feed intake, digestive processes, and performance of mid-lactation Holstein cows. Anim. Feed Sci. Technol. 154: 9-23. https://doi.org/10.1016/j.anifeedsci.2009.07.002. |
|  | Arriola, K. G., S. C. Kim, C. R. Staples, and A. T. Adesogan. 2011. Effect of fibrolytic enzyme application to low-and high-concentrate diets on the performance of lactating dairy cattle. J. Dairy Sci. 94: 832-841. https://doi.org/10.3168/jds.2010-3424. https://doi.org/10.3168/jds.S0022-0302(01)74673-5. |
|  | Bargo, F., D. H. Rearte, F. J. Santini, and L. D. Muller. 2001. Ruminal digestion by dairy cows grazing winter oats pasture supplemented with different levels and sources of protein. J. Dairy Sci. 84: 2260-2272. https://doi.org/10.3168/jds.S0022-0302(01)74673-5. |
|  | Bayat, A. R., Laura Ventto, Piia Kairenius, T. Stefański, Heidi Leskinen, Ilma Tapio, Enyew Negussie, Johanna Vilkki, and K. J. Shingfield. 2017. Dietary forage to concentrate ratio and sunflower oil supplement alter rumen fermentation, ruminal methane emissions, and nutrient utilization in lactating cows. Transl. Anim. Sci. 1: 277-286. https://doi.org/10.2527/tas2017.0032. |
|  | Beauchemin, K. A., S. M. McGinn, C. Benchaar, and L. Holtshausen. 2009. Crushed sunflower, flax, or canola seeds in lactating dairy cow diets: Effects on methane production, rumen fermentation, and milk production. J. Dairy Sci. 92: 2118-2127. https://doi.org/10.3168/jds.2008-1903. |
|  | Beauchemin, K. A., W. Z. Yang, and L. M. Rode. 2003. Effects of particle size of alfalfa-based dairy cow diets on chewing activity, ruminal fermentation, and milk production. J. Dairy Sci. 86: 630-643. https://doi.org/10.3168/jds.s0022-0302(03)73641-8. |
|  | Benchaar, C., F. Hassanat, R. Gervais, P. Y. Chouinard, H. V. Petit, and D. I. Massé. 2014. Methane production, digestion, ruminal fermentation, nitrogen balance, and milk production of cows fed corn silage-or barley silage-based diets. J. Dairy Sci. 97: 961-974. https://doi.org/10.3168/jds.2013-7122 |
|  | Benchaar, C., T. A. McAllister, and P. Y. Chouinard. 2008. Digestion, ruminal fermentation, ciliate protozoal populations, and milk production from dairy cows fed cinnamaldehyde, quebracho condensed tannin, or Yucca schidigera saponin extracts. J. Dairy Sci. 91: 4765-4777. https://doi.org/10.3168/jds.2008-1338. |
|  | Bhandari, S. K., K. H. Ominski, K. M. Wittenberg, and J. C. Plaizier. 2007. Effects of chop length of alfalfa and corn silage on milk production and rumen fermentation of dairy cows. J. Dairy Sci. 90: 2355-2366. https://doi.org/10.3168/jds.2006-609. |
|  | Bhandari, S. K., S. Li, K. H. Ominski, K. M. Wittenberg, and J. C. Plaizier. 2008. Effects of the chop lengths of alfalfa silage and oat silage on feed intake, milk production, feeding behavior, and rumen fermentation of dairy cows. J. Dairy Sci. 91: 1942-1958. https://doi.org/10.3168/jds.2007-0358. |
|  | Boddugari, K., R. J. Grant, R. Stock, and M. Lewis. 2001. Maximal replacement of forage and concentrate with a new wet corn milling product for lactating dairy cows. J. Dairy Sci. 84: 873-884. https://doi.org/10.3168/jds.S0022-0302(01)74545-6. |
|  | Bougouin, Adeline, Anne Ferlay, Michel Doreau, and Cécile Martin. 2018. Effects of carbohydrate type or bicarbonate addition to grass silage-based diets on enteric methane emissions and milk fatty acid composition in dairy cows. J. Dairy Sci. 101: 6085-6097. https://doi.org/10.3168/jds.2017-14041. |
|  | Brask, M., P. Lund, A. L. F. Hellwing, M. Poulsen, and M. R. Weisbjerg. 2013. Enteric methane production, digestibility and rumen fermentation in dairy cows fed different forages with and without rapeseed fat supplementation. Anim. Feed Sci. Technol. 184: 67-79. https://doi.org/10.1016/j.anifeedsci.2013.06.006. |
|  | Brask, M., P. Lund, M. R. Weisbjerg, A. L. F. Hellwing, M. Poulsen, M. K. Larsen, and T. Hvelplund. 2013. Methane production and digestion of different physical forms of rapeseed as fat supplements in dairy cows. J. Dairy Sci. 96: 2356-2365. https://doi.org/10.3168/jds.2011-5239. |
|  | Brito, A. F., and G. A. Broderick. 2007. Effects of different protein supplements on milk production and nutrient utilization in lactating dairy cows. J. Dairy Sci. 90: 1816-1827. https://doi.org/10.3168/jds.2006-558. |
|  | Broderick, G. A., N. D. Luchini, S. M. Reynal, G. A. Varga, and V. A. Ishler. 2008. Effect on production of replacing dietary starch with sucrose in lactating dairy cows. J. Dairy Sci. 91: 4801-4810. https://doi.org/10.3168/jds.2008-1480 |
|  | Bruckental, I., M. Holtzman, M. Kaim, Y. Aharoni, S. Zamwell, H. Voet, and A. Arieli. 2000. Effect of amount of undegradable crude protein in the diets of high-yielding dairy cows on energy balance and reproduction. Livest. Prod. Sci. 63: 131-140. https://doi.org/10.1016/S0301-6226(99)00124-4 |
|  | Calberry, J. M., J. C. Plaizier, M. S. Einarson, and B. W. McBride. 2003. Effects of replacing chopped alfalfa hay with alfalfa silage in a total mixed ration on production and rumen conditions of lactating dairy cows. J. Dairy Sci. 86: 3611-3619. https://doi.org/10.3168/jds.S0022-0302(03)73967-8. |
|  | Calomeni, G. D., R. Gardinal, B. C. Venturelli, J. E. de F. Júnior, T. H. A. Vendramini, C. S. Takiya, H. N. de Souza, and F. P. Rennó. 2015. Effects of polymer-coated slow-release urea on performance, ruminal fermentation, and blood metabolites in dairy cows. Rev. Bras. de Zootec*.* 44: 327-334. https://doi.org/10.1590/S1806-92902015000900004. |
|  | Cavallini, D., L. M. E. Mammi, M. Fustini, A. Palmonari, A. J. Heinrichs, and A. Formigoni. 2018. Effects of ad libitum or restricted access to total mixed ration with supplemental long hay on production, intake, and rumination. J. Dairy Sci. 101: 10922-10928. https://doi.org/10.3168/jds.2018-14770. |
|  | Cheng, K. F., C. Wang, G. W. Zhang, H. S. Du, Z. Z. Wu, Q. Liu, G. Guo et al. 2020. Effects of betaine and rumen-protected folic acid supplementation on lactation performance, nutrient digestion, rumen fermentation and blood metabolites in dairy cows. Anim. Feed Sci. Technol. 262: 114445. https://doi.org/10.1016/j.anifeedsci.2020.114445. |
|  | Chibisa, G. E., and T. Mutsvangwa. 2013. Effects of feeding wheat or corn-wheat dried distillers grains with solubles in low-or high-crude protein diets on ruminal function, omasal nutrient flows, urea-N recycling, and performance in cows. J. Dairy Sci. 96: 6550-6563. https://doi.org/10.3168/jds.2013-6622. |
|  | Chibisa, G. E., D. A. Christensen, and T. Mutsvangwa. 2012. Effects of replacing canola meal as the major protein source with wheat dried distillers grains with solubles on ruminal function, microbial protein synthesis, omasal flow, and milk production in cows. J. Dairy Sci. 95: 824-841. https://doi.org/10.3168/jds.2011-4718. |
|  | Colmenero, J., J. Olmos, and G. A. Broderick. 2006. Effect of dietary crude protein concentration on milk production and nitrogen utilization in lactating dairy cows. J. Dairy Sci. 89: 1704-1712. https://doi.org/10.3168/jds.s0022-0302(06)72238-x. |
|  | Dann, H. M., H. A. Tucker, K. W. Cotanch, P. D. Krawczel, C. S. Mooney, R. J. Grant, and T. Eguchi. 2014. Evaluation of lower-starch diets for lactating Holstein dairy cows. J. Dairy Sci. 97: 7151-7161. https://doi.org/10.3168/jds.2014-8341. |
|  | Dias, A. L. G., J. A. Freitas, B. Micai, R. A. Azevedo, L. F. Greco, and J. E. P. Santos. 2018. Effect of supplemental yeast culture and dietary starch content on rumen fermentation and digestion in dairy cows. J. Dairy Sci. 101: 201-221. https://doi.org/10.3168/jds.2017-13241. |
|  | Doepel, L., A. Cox, and A. Hayirli. 2009. Effects of increasing amounts of dietary wheat on performance and ruminal fermentation of Holstein cows. J. Dairy Sci. 92: 3825-3832. https://doi.org/10.3168/jds.2008-1062. |
|  | Dschaak, C. M., C. T. Noviandi, J-S. Eun, V. Fellner, Allen J. Young, Dale R. ZoBell, and C. E. Israelsen. 2011. Ruminal fermentation, milk fatty acid profiles, and productive performance of Holstein dairy cows fed 2 different safflower seeds. J. Dairy Sci. 94: 5138-5150. https://doi.org/10.3168/jds.2011-4541. |
|  | Eun, J-S., and K. A. Beauchemin. 2005. Effects of a proteolytic feed enzyme on intake, digestion, ruminal fermentation, and milk production. J. Dairy Sci. 88: 2140-2153. https://doi.org/10.3168/jds.S0022-0302(05)72890-3. |
|  | Faciola, A. P., and G. A. Broderick. 2014. Effects of feeding lauric acid or coconut oil on ruminal protozoa numbers, fermentation pattern, digestion, omasal nutrient flow, and milk production in dairy cows. J. Dairy Sci. 97: 5088-5100. https://doi.org/10.3168/jds.2013-7653. |
|  | Fredin, S. M., M. S. Akins, L. F. Ferraretto, and R. D. Shaver. 2015. Effects of corn-based diet starch content and neutral detergent fiber source on lactation performance, digestibility, and bacterial protein flow in dairy cows. J. Dairy Sci. 98: 554-565. https://doi.org/10.3168/jds.2014-8592. |
|  | Gao, X., and M. Oba. 2014. Relationship of severity of subacute ruminal acidosis to rumen fermentation, chewing activities, sorting behavior, and milk production in lactating dairy cows fed a high-grain diet. J. Dairy Sci. 97: 3006-3016. https://doi.org/10.3168/jds.2013-7472. |
|  | Gao, X., and M. Oba. 2016. Characteristics of dairy cows with a greater or lower risk of subacute ruminal acidosis: volatile fatty acid absorption, rumen digestion, and expression of genes in rumen epithelial cells. J. Dairy Sci. 99: 8733-8745. https://doi.org/10.3168/jds.2016-11570. |
|  | Gao, X., and M. Oba. 2016. Effect of increasing dietary nonfiber carbohydrate with starch, sucrose, or lactose on rumen fermentation and productivity of lactating dairy cows. J. Dairy Sci. 99: 291-300. https://doi.org/10.3168/jds.2015-9871. |
|  | Gehman, A. M., Paul J. Kononoff, C. R. Mullins, and B. N. Janicek. 2008. Evaluation of nitrogen utilization and the effects of monensin in dairy cows fed brown midrib corn silage. J. Dairy Sci. 91: 288-300. https://doi.org/10.3168/jds.2007-0098 |
|  | Hao, X. Y., H. Gao, X. Y. Wang, G. N. Zhang, and Y. G. Zhang. 2017. Replacing alfalfa hay with dry corn gluten feed and Chinese wild rye grass: Effects on rumen fermentation, rumen microbial protein synthesis, and lactation performance in lactating dairy cows. J. Dairy Sci. 100: 2672-2681. https://doi.org/10.3168/jds.2016-11645. |
|  | Hassanat, F., R. Gervais, and C. Benchaar. 2017. Methane production, ruminal fermentation characteristics, nutrient digestibility, nitrogen excretion, and milk production of dairy cows fed conventional or brown midrib corn silage. J. Dairy Sci. 100: 2625-2636. https://doi.org/10.3168/jds.2016-11862. |
|  | Hassanat, F., R. Gervais, Christine Julien, D. I. Massé, A. Lettat, P. Y. Chouinard, H. V. Petit, and C. Benchaar. 2013. 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. 96: 4553-4567. https://doi.org/10.3168/jds.2012-6480. |
|  | Hassanat, F., R. Gervais, D. I. Massé, H. V. Petit, and C. Benchaar. 2014. Methane production, nutrient digestion, ruminal fermentation, N balance, and milk production of cows fed timothy silage-or alfalfa silage-based diets. J. Dairy Sci. 97: 6463-6474. https://doi.org/10.3168/jds.2014-8069. |
|  | Hristov, A. N., C. Domitrovich, A. Wachter, T. Cassidy, C. Lee, K. J. Shingfield, Piia Kairenius, J. Davis, and J. Brown. 2011. Effect of replacing solvent-extracted canola meal with high-oil traditional canola, high-oleic acid canola, or high-erucic acid rapeseed meals on rumen fermentation, digestibility, milk production, and milk fatty acid composition in lactating dairy cows. J. Dairy Sci. 94: 4057-4074. https://doi.org/10.3168/jds.2011-4283. |
|  | Hristov, A. N., C. Lee, T. Cassidy, K. Heyler, J. A. Tekippe, G. A. Varga, B. Corl, and R. C. Brandt. 2013. Effect of Origanum vulgare L. leaves on rumen fermentation, production, and milk fatty acid composition in lactating dairy cows. J. Dairy Sci. 96: 1189-1202. https://doi.org/10.3168/jds.2012-5975. |
|  | Hristov, A. N., C. Lee, T. Cassidy, M. Long, K. Heyler, B. Corl, and R. Forster. 2011. Effects of lauric and myristic acids on ruminal fermentation, production, and milk fatty acid composition in lactating dairy cows. J. Dairy Sci. 94: 382-395. https://doi.org/10.3168/jds.2010-3508. |
|  | Hristov, A. N., G. Varga, T. Cassidy, M. Long, K. Heyler, SKR A. Karnati, B. Corl, C. J. Hovde, and I. Yoon. 2010. Effect of Saccharomyces cerevisiae fermentation product on ruminal fermentation and nutrient utilization in dairy cows. J. Dairy Sci. 93: 682-692. https://doi.org/10.3168/jds.2009-2379. |
|  | Jenkins, C. J. R., S. C. Fernando, C. L. Anderson, N. D. Aluthge, E. Castillo-Lopez, G. I. Zanton, and P. J. Kononoff. 2020. The effects of 2-hydroxy-4-methylthio-butanoic acid supplementation on the rumen microbial population and duodenal flow of microbial nitrogen. J. Dairy Sci. 103: 10161-10174. https://doi.org/10.3168/jds.2019-17664. |
|  | Kammes, K. L., and M. S. Allen. 2012. Nutrient demand interacts with grass maturity to affect milk fat concentration and digestion responses in dairy cows. J. Dairy Sci. 95: 5133-5148. https://doi.org/10.3168/jds.2011-4963. |
|  | Kammes, K. L., and M. S. Allen. 2012. Nutrient demand interacts with grass particle length to affect digestion responses and chewing activity in dairy cows. J. Dairy Sci. 95: 807-823. https://doi.org/10.3168/jds.2011-4588. |
|  | Kammes, K. L., Y. Ying, and M. S. Allen. 2012. Nutrient demand interacts with legume maturity to affect rumen pool sizes in dairy cows. J. Dairy Sci. 95: 2632-2647. https://doi.org/10.3168/jds.2011-4996. |
|  | Kargar, Shahryar, Gholam Reza Ghorbani, Masoud Alikhani, Mohammad Khorvash, Ladan Rashidi, and David J. Schingoethe. 2012. Lactational performance and milk fatty acid profile of Holstein cows in response to dietary fat supplements and forage: concentrate ratio. Livest. Sci. 150: 274-283. https://doi.org/10.1016/j.livsci.2012.09.015. |
|  | Keim, J. P., J. Daza, I. Beltrán, O. A. Balocchi, R. G. Pulido, P. Sepúlveda-Varas, D. Pacheco, and R. Berthiaume. 2020. Milk production responses, rumen fermentation, and blood metabolites of dairy cows fed increasing concentrations of forage rape (Brassica napus ssp. Biennis). J. Dairy Sci. 103: 9054-9066. https://doi.org/10.3168/jds.2020-18785. |
|  | Kelzer, Jolene Madonna, Paul J. Kononoff, A. M. Gehman, L. O. Tedeschi, K. Karges, and M. L. Gibson. 2009. Effects of feeding three types of corn-milling coproducts on milk production and ruminal fermentation of lactating Holstein cattle. J. Dairy Sci. 92: 5120-5132. https://doi.org/10.3168/jds.2009-2208. |
|  | Khadem, A., M. Sharifi, A. Afzalzadeh, and M. Rezaeian. Effects of diets containing alfalfa hay or barley flour mixed alfalfa silage on feeding behavior, productivity, rumen fermentation and blood metabolites in lactating cows. Anim. Sci. J. 80: 403-410. https://doi.org/10.1111/j.1740-0929.2009.00653.x. |
|  | Khezri, A., K. Rezayazdi, M. Danesh Mesgaran, and M. Moradi-Sharbabk. 2009. Effect of different rumen-degradable carbohydrates on rumen fermentation, nitrogen metabolism and lactation performance of Holstein dairy cows. Asian Australas. J. Anim. Sci. 22: 651-658. http://dx.doi.org/10.5713/ajas.2009.80426. |
|  | Kononoff, P. J., A. J. Heinrichs, and H. A. Lehman. 2003. The effect of corn silage particle size on eating behavior, chewing activities, and rumen fermentation in lactating dairy cows. J. Dairy Sci. 86: 3343-3353. https://doi.org/10.3168/jds.s0022-0302(03)73937-x. |
|  | Kononoff, P. J., and A. J. Heinrichs. 2003. The effect of corn silage particle size and cottonseed hulls on cows in early lactation. J. Dairy Sci. 86: 2438-2451. https://doi.org/10.3168/jds.s0022-0302(03)73838-7. |
|  | Kononoff, P. J., and A. J. Heinrichs.2003. The effect of reducing alfalfa haylage particle size on cows in early lactation. J. Dairy Sci. 86: 1445-1457. https://doi.org/10.3168/jds.S0022-0302(03)73728-X. |
|  | Korhonen, M., A. Vanhatalo, and P. Huhtanen. 2002. Effect of protein source on amino acid supply, milk production, and metabolism of plasma nutrients in dairy cows fed grass silage. J. Dairy Sci. 85: 3336-3351. https://doi.org/10.3168/jds.s0022-0302(02)74422-6. |
|  | Kowsar, R., G. R. Ghorbani, M. Alikhani, M. Khorvash, and A. Nikkhah. 2008. Corn silage partially replacing short alfalfa hay to optimize forage use in total mixed rations for lactating cows. J. Dairy Sci. 91: 4755-4764. https://doi.org/10.3168/jds.2008-1302. |
|  | Krause, K. M., D. K. Combs, and K. A. Beauchemin. 2003. Effects of increasing levels of refined cornstarch in the diet of lactating dairy cows on performance and ruminal pH. J. Dairy Sci. 86: 1341-1353. https://doi.org/10.3168/jds.S0022-0302(03)73719-9. |
|  | Lechartier, Cyril, and J-L. Peyraud. 2010. 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. 93: 666-681. https://doi.org/10.3168/jds.2009-2349. |
|  | Li, C., K. A. Beauchemin, and W. Yang. 2020. Feeding diets varying in forage proportion and particle length to lactating dairy cows: I. Effects on ruminal pH and fermentation, microbial protein synthesis, digestibility, and milk production. J. Dairy Sci. 103: 4340-4354. https://doi.org/10.3168/jds.2019-17606. |
|  | Longuski, R. A., Y. Ying, and M. S. Allen. 2009. Yeast culture supplementation prevented milk fat depression by a short-term dietary challenge with fermentable starch. J. Dairy Sci. 92: 160-167. https://doi.org/10.3168/jds.2008-0990. |
|  | Martin, C., A. Ferlay, P. Mosoni, Y. Rochette, Y. Chilliard, and M. Doreau. 2016. Increasing linseed supply in dairy cow diets based on hay or corn silage: Effect on enteric methane emission, rumen microbial fermentation, and digestion. J. Dairy Sci. 99: 3445-3456. https://doi.org/10.3168/jds.2015-10110. |
|  | Maxin, G., F. Glasser, C. Hurtaud, Jean-L. Peyraud, and H. Rulquin. 2011. Combined effects of trans-10, cis-12 conjugated linoleic acid, propionate, and acetate on milk fat yield and composition in dairy cows. J. Dairy Sci. 94: 2051-2059. https://doi.org/10.3168/jds.2010-3844. |
|  | Melgar, A., M. T. Harper, J. Oh, F. Giallongo, M. E. Young, T. L. Ott, S. Duval, and A. N. Hristov. 2020. Effects of 3-nitrooxypropanol on rumen fermentation, lactational performance, and resumption of ovarian cyclicity in dairy cows. J. Dairy Sci. 103: 410-432. https://doi.org/10.3168/jds.2019-17085. |
|  | Mohammed, R., J. J. Kennelly, J. K. G. Kramer, K. A. Beauchemin, C. S. Stanton, and J. J. Murphy. 2010. Effect of grain type and processing method on rumen fermentation and milk rumenic acid production. Anim. 4: 1425-1444. https://doi.org/10.1017/S175173111000039X. |
|  | Molavian, M., G. R. Ghorbani, H. Rafiee, and K. A. Beauchemin. 2020. Substitution of wheat straw with sugarcane bagasse in low-forage diets fed to mid-lactation dairy cows: Milk production, digestibility, and chewing behavior. J. Dairy Sci. 103: 8034-8047. https://doi.org/10.3168/jds.2020-18499. |
|  | Mullins, C. R., K. N. Grigsby, D. E. Anderson, E. C. Titgemeyer, and B. J. Bradford. 2010. Effects of feeding increasing levels of wet corn gluten feed on production and ruminal fermentation in lactating dairy cows. J. Dairy Sci. 93: 5329-5337. https://doi.org/10.3168/jds.2010-3310. |
|  | Naderi, N., G. R. Ghorbani, A. Sadeghi-Sefidmazgi, S. M. Nasrollahi, and K. A. Beauchemin. 2016. Shredded beet pulp substituted for corn silage in diets fed to dairy cows under ambient heat stress: Feed intake, total-tract digestibility, plasma metabolites, and milk production. J. Dairy Sci. 99: 8847-8857. https://doi.org/10.3168/jds.2016-11029. |
|  | Oelker, E. R., C. Reveneau, and J. L. Firkins. 2009. Interaction of molasses and monensin in alfalfa hay-or corn silage-based diets on rumen fermentation, total tract digestibility, and milk production by Holstein cows. J. Dairy Sci. 92: 270-285. https://doi.org/10.3168/jds.2008-1432. |
|  | Olijhoek, D. W., A. L. F. Hellwing, K. Grevsen, L. S. Haveman, M. R. Chowdhury, P. Løvendahl, M. R. Weisbjerg, S.J. Noel, O. Hojberg, L. Wilking, and P. Lund. 2019. Effect of dried oregano (Origanum vulgare L.) plant material in feed on methane production, rumen fermentation, nutrient digestibility, and milk fatty acid composition in dairy cows. J. Dairy Sci.102: 9902-9918. https://doi.org/10.3168/jds.2019-16329. |
|  | Olijhoek, D. W., A. L. F. Hellwing, M. Brask, M. R. Weisbjerg, O. Højberg, M. K. Larsen, Jan Dijkstra, E. J. Erlandsen, and P. Lund. 2016. Effect of dietary nitrate level on enteric methane production, hydrogen emission, rumen fermentation, and nutrient digestibility in dairy cows. J. Dairy Sci. 99: 6191-6205. https://doi.org/10.3168/jds.2015-10691. |
|  | Onetti, S. G., R. D. Shaver, S. J. Bertics, and R. R. Grummer. 2003. Influence of corn silage particle length on the performance of lactating dairy cows fed supplemental tallow. J. Dairy Sci. 86: 2949-2957. https://doi.org/10.3168/jds.S0022-0302(03)73892-2. |
|  | Pan, L., D. P. Bu, J. Q. Wang, J. B. Cheng, X. Z. Sun, L. Y. Zhou, J. J. Qin, X. K. Zhang, and Y. M. Yuan. 2014. Effects of Radix Bupleuri extract supplementation on lactation performance and rumen fermentation in heat-stressed lactating Holstein cows. Anim. Feed Sci. Technol. 187: 1-8. https://doi.org/10.1016/j.anifeedsci.2013.09.008. |
|  | Paula, E. M., G. A. Broderick, M. A. C. Danes, N. E. Lobos, G. I. Zanton, and A. P. Faciola. 2018. Effects of replacing soybean meal with canola meal or treated canola meal on ruminal digestion, omasal nutrient flow, and performance in lactating dairy cows. J. Dairy Sci. 101: 328-339. https://doi.org/10.3168/jds.2017-13392. |
|  | Pereira, A. B. D., N. L. Whitehouse, K. M. Aragona, C. S. Schwab, S. F. Reis, and A. F. Brito. 2017. Production and nitrogen utilization in lactating dairy cows fed ground field peas with or without ruminally protected lysine and methionine. J. Dairy Sci. 100: 6239-6255. https://doi.org/10.3168/jds.2016-12140. |
|  | Plaizier, J. C. 2004. Replacing chopped alfalfa hay with alfalfa silage in barley grain and alfalfa-based total mixed rations for lactating dairy cows. J. Dairy Sci. 87: 2495-2505. https://doi.org/10.3168/jds.S0022-0302(04)73374-3. |
|  | Poorkasegaran, S., and A. T. Yansari. 2014. Effects of different sources of carbohydrates on intake, digestibility, chewing, and performance of Holstein dairy cows. J. Anim. Sci. Biotechnol. 5: 1-11. http://dx.doi.org/10.1186/2049-1891-5-6. |
|  | Ramirez, HA Ramirez, E. Castillo Lopez, K. J. Harvatine, and P. J. Kononoff. 2015. Fat and starch as additive risk factors for milk fat depression in dairy diets containing corn dried distillers grains with solubles. J. Dairy Sci. 98: 1903-1914. https://doi.org/10.3168/jds.2014-8528. |
|  | Ramirez-Ramirez, H. A., E. Castillo Lopez, C. J. R. Jenkins, N. D. Aluthge, C. Anderson, S. C. Fernando, K. J. Harvatine, and P. J. Kononoff. 2016. Reduced-fat dried distillers grains with solubles reduces the risk for milk fat depression and supports milk production and ruminal fermentation in dairy cows. J. Dairy Sci. 99: 1912-1928. https://doi.org/10.3168/jds.2015-9712. |
|  | Razzaghi, A., R. Valizadeh, M. H. Ghaffari, and A. F. Brito. 2020. Liquid molasses interacts with buffers to affect ruminal fermentation, milk fatty acid profile, and milk fat synthesis in dairy cows fed high-concentrate diets. J. Dairy Sci. 103: 4327-4339. https://doi.org/10.3168/jds.2019-17169. |
|  | Reynal, S. M., and G. A. Broderick. 2005. Effect of dietary level of rumen-degraded protein on production and nitrogen metabolism in lactating dairy cows. J. Dairy Sci. 88: 4045-4064. https://doi.org/10.3168/jds.S0022-0302(05)73090-3. |
|  | Ronquillo, M. Gonzalez, A. P. Faciola, H. Nursoy, and G. A. Broderick. 2021. Effect of increasing dietary protein with constant lysine: methionine ratio on production and omasal flow of nonammonia nitrogen in lactating dairy cows. J. Dairy Sci. 104: 5319-5331. https://doi.org/10.3168/jds.2020-19541. |
|  | Schroeder, G. F., J. E. Delahoy, I. Vidaurreta, F. Bargo, G. A. Gagliostro, and L. D. Muller. 2003. Milk fatty acid composition of cows fed a total mixed ration or pasture plus concentrates replacing corn with fat. J. Dairy Sci. 86: 3237-3248. https://doi.org/10.3168/jds.S0022-0302(03)73927-7. |
|  | Schroeder, J. W. 2003. Optimizing the level of wet corn gluten feed in the diet of lactating dairy cows. J. Dairy Sci. 86: 844-851. https://doi.org/10.3168/jds.S0022-0302(03)73667-4. |
|  | Shahmoradi, A., M. Alikhani, A. Riasi, G. R. Ghorbani, and M. H. Ghaffari. 2016. Effects of partial replacement of barley grain with beet pulp on performance, ruminal fermentation and plasma concentration of metabolites in transition dairy cows. J. Anim. Physiol. Anim. 100: 178-188. https://doi.org/10.1111/jpn.12305. |
|  | Sharifi, M., A. Hosseinkhani, M. Sofizade, and J. Mosavi. 2016. Effects of fat supplementation and chop length on milk composition and ruminal fermentation of cows fed diets containing Alfalfa silage. Iran. J. Appl. Anim. Sci. 6: 293-301. |
|  | Shepherd, D. M., Jeffrey Lynn Firkins, and P. VonBehren. 2014. Chewing, rumen pool characteristics, and lactation performance of dairy cows fed 2 concentrations of a corn wet-milling coproduct with different forage sources. J. Dairy Sci. 97: 5786-5799. https://doi.org/10.3168/jds.2014-8169. |
|  | Shin, J. H., D. Wang, S. C. Kim, A. T. Adesogan, and C. R. Staples. 2012. Effects of feeding crude glycerin on performance and ruminal kinetics of lactating Holstein cows fed corn silage-or cottonseed hull-based, low-fiber diets. J. Dairy Sci. 95: 4006-4016. https://doi.org/10.3168/jds.2011-5121. |
|  | Shingfield, K. J., Seppo Ahvenjärvi, Vesa Toivonen, Anu Ärölä, K. V. V. Nurmela, Pekka Huhtanen, and J. Mikko Griinari. 2003. Effect of dietary fish oil on biohydrogenation of fatty acids and milk fatty acid content in cows. Anim. Sci. 77: 165-179. https://doi.org/10.1017/S1357729800053765. |
|  | Sun, Y., and M. Oba. 2014. 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. 97: 1594-1602. https://doi.org/10.3168/jds.2013-7068. |
|  | Tager, L. R., and K. M. Krause. 2011. Effects of essential oils on rumen fermentation, milk production, and feeding behavior in lactating dairy cows. J. Dairy Sci. 94: 2455-2464. https://doi.org/10.3168/jds.2010-3505. |
|  | Taweel, H. Z., B. M. Tas, H. J. Smit, Anjo Elgersma, J. Dijkstra, and S. Tamminga. 2005. Effects of feeding perennial ryegrass with an elevated concentration of water-soluble carbohydrates on intake, rumen function and performance of dairy cows. Anim. Feed Sci. Technol. 121: 243-256. https://doi.org/10.1016/j.anifeedsci.2005.02.024. |
|  | Thomson, Anna L., David J. Humphries, Kirsty E. Kliem, Marie T. Dittmann, and Chris K. Reynolds. 2017. Effects of replacing maize silage with lucerne silage and lucerne silage chop length on rumen function and milk fatty acid composition. J. Dairy Sci. 100: 7127-7138. https://doi.org/10.3168/jds.2017-12914. |
|  | Van Gastelen, S., E. C. Antunes-Fernandes, K. A. Hettinga, G. Klop, S. J. J. Alferink, W. H. Hendriks, and J. Dijkstra. 2015. Enteric methane production, rumen volatile fatty acid concentrations, and milk fatty acid composition in lactating Holstein-Friesian cows fed grass silage-or corn silage-based diets. J. Dairy Sci. 98: 1915-1927. https://doi.org/10.3168/jds.2014-8552. |
|  | Van Zijderveld, S. M., B. Fonken, J. Dijkstra, W. J. J. Gerrits, H. B. Perdok, W. Fokkink, and J. R. Newbold. 2011. Effects of a combination of feed additives on methane production, diet digestibility, and animal performance in lactating dairy cows. J. Dairy Sci. 94: 1445-1454. https://doi.org/10.3168/jds.2010-3635. |
|  | Wanapat, M., S. Polyorach, K. Boonnop, C. Mapato, and A. Cherdthong. 2009. Effects of treating rice straw with urea or urea and calcium hydroxide upon intake, digestibility, rumen fermentation and milk yield of dairy cows. Livest. Sci. 125: 238-243. https://doi.org/10.1016/j.livsci.2009.05.001. |
|  | Wang, C., Q. Liu, G. Guo, W. J. Huo, Y. L. Zhang, C. X. Pei, and S. L. Zhang. 2019. Effects of rumen-protected folic acid and branched-chain volatile fatty acids supplementation on lactation performance, ruminal fermentation, nutrient digestion and blood metabolites in dairy cows. Anim. Feed Sci. Technol. 247: 157-165. https://doi.org/10.1016/j.anifeedsci.2018.11.015. |
|  | Xu, Jun, Yujie Hou, Hongbo Yang, Renhuang Shi, Caixia Wu, Yongjiu Huo, and Guoqi Zhao. 2014. Effects of forage sources on rumen fermentation characteristics, performance, and microbial protein synthesis in midlactation cows. Asian Australas. J. Anim. Sci. 27: 667-673. https://doi.org/10.5713%2Fajas.2013.13604. |
|  | Yang, W. Z., and K. A. Beauchemin. 2006. Physically effective fiber: method of determination and effects on chewing, ruminal acidosis, and digestion by dairy cows. J. Dairy Sci. 89: 2618-2633. https://doi.org/10.3168/jds.S0022-0302(06)72339-6. |
|  | Yang, W. Z., and K. A. Beauchemin. 2007. Altering physically effective fiber intake through forage proportion and particle length: Chewing and ruminal pH. J. Dairy Sci. 90: 2826-2838. https://doi.org/10.3168/jds.2007-0032. |
|  | Zhang, Guangning, Yang Li, Xinpeng Fang, Yimin Cai, and Yonggen Zhang. 2020. Lactation performance, nitrogen utilization, and profitability in dairy cows fed fermented total mixed ration containing wet corn gluten feed and corn stover in combination replacing a portion of alfalfa hay. Anim. Feed Sci. Technol. 269: 114687. https://doi.org/10.1016/j.anifeedsci.2020.114687. |
|  | Zhang, S. Z., G. B. Penner, M. Abdelqader, and M. Oba. 2010. 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. 93: 3243-3252. https://doi.org/10.3168/jds.2009-3011. |
|  | Zhang, S. Z., G. B. Penner, W. Z. Yang, and M. Oba. 2010. Effects of partially replacing barley silage or barley grain with dried distillers grains with solubles on rumen fermentation and milk production of lactating dairy cows. J. Dairy Sci. 93: 3231-3242. https://doi.org/10.3168/jds.2009-3005. |
|  | Zhang, Z. D., C. Wang, H. S. Du, Q. Liu, G. Guo, W. J. Huo, J. Zhang, Y. L. Zhang, C. X. Pei, and S. L. Zhang. 2020. Effects of sodium selenite and coated sodium selenite on lactation performance, total tract nutrient digestion and rumen fermentation in Holstein dairy cows. Anim. 14: 2091-2099. https://doi.org/10.1017/S1751731120000804. |