

1. New Mexico State University

A. Refereed journal articles.

- A. J. Garrett, G. Rincon, J. F. Medrano, M. A. Elzo, G. A. Silver, and M. G. Thomas. 2008. Promoter region of the bovine growth hormone receptor gene: single nucleotide polymorphism discovery in cattle and association with performance in Brangus bulls. *J. Anim Sci.* 86:3315-3323.
- Bailey, D.W. and D. Jensen. 2008. Method of supplementation may affect cattle grazing patterns. *Rangeland Ecol. Manage.* 61:131-135.
- Bailey, D.W., H.C. VanWagoner, R. Weinmeister, and D. Jensen. 2008. Evaluation of low-stress herding and supplement placement for managing cattle grazing in riparian and upland areas. *Rangeland Ecol. Manage.* 61:26-37.
- Bailey, D.W., H.C. VanWagoner, R. Weinmeister, and D. Jensen. 2008. Comparison of low-moisture blocks and salt for manipulating grazing patterns of beef cows. *J. Anim. Sci.* 86:1271-1277.
- Decker, J. E., P. Luna-Nevarez, A. M. Encinias, R. M. Enns, and M. G. Thomas. 2008. Case study: scrotal circumference in beef bulls: prediction of measures at 365 days of age from measures at 240 days of age with data from the Tucumcari Bull Test. *Prof. Anim. Sci.* 24:1-6.
- T. Smith, M. G. Thomas, T. D. Bidner, J. C. Paschal, and D. E. Franke. 2009. Single nucleotide polymorphisms in Brahman steers and their association with carcass and tenderness traits. *Genet. Mol. Res.* 8:39-46.

B. Book chapter.

- Bailey, D. W. and F. D. Provenza. 2008. Mechanisms determining large-herbivore distribution. *In:* H. H. T. Prins and F. van Langevelde [EDS.]. *Resource ecology: spatial and temporal dynamics of foraging.* Dordrecht, Netherlands: Springer. p. 7-28.

C. Invited academic and extension efforts.

M. Thomas continues effort as Chair of the IBBA Breed Improvement Committee ad-hoc group known as DNA technology committee. Effort becoming much more strategic and educational. How do we incorporate genetic markers into a multi-breed EPD? Branch Ranch, Lovington, NM. Developing DNA paternity testing program and within herd EPD system for an organization of 5 cow-calf operations and a feedlot. Assisting with NMSU-Ag Marketing project for Branch Ranch-Natural Beef of NM, LLC.

2. Washington State University

Publications: Peer-reviewed journal articles:

- Chen J, Guridi M, Fernyhough ME, Jiang Z, Guan LL, Hausman GJ, Dodson MV. 2009. Initial differences in lipid processing leading to pig- and beef-derived mature adipocyte dedifferentiation. *Basic and Applied Myology – European Journal of Translational Myology* (in press).
- Chen J, Guridi M, Fernyhough ME, Jiang Z, Guan LL, Hausman GJ, Dodson MV. 2009. Clonal mature adipocyte production of proliferative-competent daughter cells requires lipid export prior to cell division. *International Journal of Stem Cells* 2:76-79.
- Heaton, M.P., J.W. Keele, G.P. Harhay, J.A. Richt, M. Koohmaraie, T.L. Wheeler, S.D. Shackelford, E. Casas, D.A. King, T.S. Sonstegard, C.P. Van Tassell, H.L. Neiberger, C.C. Chase, Jr., T.S. Kalbfleisch, T.P.L. Smith, M.L. Clawson, W.W. Laegreid. Prevalence of the prion gene E211K variant in U.S. cattle. 2008. *BMC Veterinary Research*. 4:25 (14 Jul 2008).
<http://www.biomedcentral.com/1746-6148/4/25>
- Jiang Z, Michal JJ, Tobey DJ, Daniels TF, Rule DC, MacNeil MD. 2008. Significant associations of stearoyl-CoA desaturase (*SCD1*) gene with fat deposition and composition in skeletal muscle. *International Journal of Biological Sciences* 4:345 – 351.
- Jiang Z, Michal JJ, Tobey DJ, Wang Z, MacNeil MD, Magnuson NS. 2008. Comparative understanding of *UTS2* and *UTS2R* genes for their involvement in type 2 diabetes mellitus. *International Journal of Biological Sciences* 4:96-102.
- Jiang Z, Rokhsar DS, Harland RM. 2009. Old can be new again: HAPPY whole genome sequencing, mapping and assembly. *International Journal of Biological Sciences* 5:298-303
- Jiang Z, Wu X-L, Zhang M, Michal JJ, Wright Jr. RW. 2008. The complementary neighborhood patterns and methylation-to-mutation likelihood structures of 15,110 single nucleotide polymorphisms in the bovine genome. *Genetics* 180:639-647.
- Settles, M., R. Zanella, S.D. McKay, R.D. Schnabel, J.F. Taylor, T. Fyock, R.H. Whitlock, Y. Schukken, J.S. Van Kessel, J. Karns, E. Hovingh, J.M. Smith, H.L. Neiberger. A whole genome association analysis identifies loci associated with *Mycobacterium avium* subsp. *paratuberculosis* infection status in US Holstein cattle. *Animal Genetics* (in press).
- Wang XX, Xue CY, Wang XN, Liu HL, Xu YX, Zhao RQ, Jiang Z, Dodson MV, Chen J. 2009. Differential display of expressed genes reveals a novel function of *SFRS18* in regulation of intramuscular fat deposition. *International Journal of Biological Sciences* 5: 28 - 33.
- Wibowo TA, Gaskins CT, Newberry RC, Thorgaard GH, Michal JJ, Jiang Z. 2008. Genome assembly anchored QTL map of bovine chromosome 14. *International Journal of Biological Sciences* 4:406 – 414.
- Xu XL, Xu XW, Pan PW, Li K, Jiang Z, Yu M, Rothschild MF, Liu B. 2009. Porcine skeletal muscle differentially expressed gene *CMYA1*: isolation, characterization, mapping, expression and association analysis with carcass traits. *Animal Genetics* 40: 255 - 261.

Book chapters:

- Neiberger, H.L., R. Zanella. Genomics of reproductive diseases in cattle and swine *in* *Reproductive Genomics in Domestic Animals*. Z. Jiang and T. Ott, editors. Wiley-Blackwell, Ames, IA (in press).

Abstracts:

- Decker, J.E., J. C. Pires, G. C. Conant, S. D. McKay, M. P. Heaton, J. Vilkki, K. Chen, A. Cooper, C. M. Seabury, A. R. Caetano, G. S. Johnson, R. A. Brennehan, O. Hanotte, L. L. Coutinho, M. E. Babar, L. S. Eggert, P. Wiener, J. Kim, K. Suk Kim, T. S. Sonstegard, C. P. Van Tassell, H. L. Neibergs, R. D. Schnabel, J. F. Taylor. 2009. Divergence times and signatures of selection from phylogenomic analysis of Pecoran species.
- Decker, JD, J.C. Pires, G.C. Conant, S. D. McKay, M.P. Heaton, J. Vilkki, K. Chen, A. Cooper, C.M. Seabury, A.R. Caetano, G.S. Johnson, R.A. Brennehan, O. Hanotte, L.L. Coutinho, M.E. Babar, L.S. Eggert, P. Wiener, J.-J. Kim, K. Suk Kim, T. S. Sonstegard, C.P. Van Tassell, H.L. Neibergs, R.D. Schnabel, J.F. Taylor. Divergence times and signatures of selection from phylogenomic analysis of Pecoran species. 2009. Plant & Animal Genome XVII, San Diego, California
- Heaton, M.P., J.W. Keele, G.P. Harhay, J.A. Richt, M. Koohmaraie, T.L. Wheeler, S.D. Shackelford, E. Casas, D.A. King, T.S. Sonstegard, C.P. Van Tassell, H.L. Neibergs, C.C. Chase, Jr., T.S. Kalbfleisch, T.P.L. Smith, M.L. Clawson, W.W. Laegreid. Prevalence of the prion gene E211K variant in U.S. cattle. 2008. Plant & Animal Genome XVI, San Diego, California.
- Heaton, M.P., Keele, J.W., Harhay, G.P., Richt, J.A., Koohmaraie, M., Wheeler, T.L., Shackelford, S.D., Casas, E., King, D.A., Sonstegard, T.S., Van Tassell, C.P., Neibergs, H.L., Kalbfleisch, T.S., Clawson, M.L., Laegreid, W.W. 2008. Prevalence of the prion gene E211K variant in U.S. cattle.
- Settles, M., R. Zanella, S. McKay, R. Schnabel, J. Taylor, T. Fyock, R. Whitlock, Y. Schukken, E. Hovingh, J. Van Kessel, J. Karns, J.M. Smith, H. Neibergs. Whole genome association study of Johne's disease in cattle. 2008. International Symposium on Animal Functional Genomics, Edinburgh, UK. ISAFG-Poster 93.
- Settles, M., R. Zanella, S. McKay, R. Schnabel, J. Taylor, T. Fyock, R. Whitlock, Y. Schukken, E. Hovingh, J. Van Kessel, J. Karns, J.M. Smith, H. Neibergs. Identification of loci associated with tolerance to Johne's disease in Holstein cattle. 2008. Johne's Disease Integrated Program Meeting, East Lansing, Michigan.
- Settles, M., Zanella, R., McKay, S., Schnabel, R., Taylor, J., Fyock, T., Whitlock, R., Schukken, Y., Van Kessel, J., Karns, J., Hoving, E., Smith, J., Neibergs, H. 2008. Whole Genome Association Study of Johne's Disease.
- Zanella, R., M. Settles, R.H. Whitlock, S.D. McKay, R.D. Schnabel, J.F. Taylor, T. Fyock, Y. Schukken, J. Van Kessel, J. Karns, E. Hovingh, J.M. Smith, H.L. Neibergs. Identification of loci associated with tolerance to Johne's disease in Holstein cattle. 2009. Plant & Animal Genome XVII, San Diego, California.
- Zanella, R., M. Settles, T. Fyock, R. Whitlock, Y. Schukken, J. Van Kessel, J. Karns, E. Hovingh, J. Smith, C. Van Tassel, C. Gaskins, H. Neibergs. Heritability of genetic tolerance to Johne's disease. 2008. Joint American Dairy Science Association-American Society of Animal Science Annual Meeting, Indianapolis, Indiana.
- Zanella, R., M. Settles, T. Fyock, R. Whitlock, Y. Schukken, J. Van Kessel, J. Karns, E. Hoving, J. Smith, C. Van Tassel, C. Gaskins, H. Neibergs. 2008. Heritability of Genetic Tolerance to Johne's Disease
- Zanella, R., Settles, M., Whitlock, R.H., McKay, S.D., Schnabel, R.D., Taylor, J.F., Fyock, T., Schukken, Y., Van Kessel, J., Karns, J., Hovingh, E., Smith, J.M., Neibergs, H.L. 2009. Identification of loci associated with tolerance to Johne's disease in Holstein cattle.

3. Colorado State University

Refereed Publications:

- Crews, D. H., Jr. and R. M. Enns. 2008. Models for genetic evaluation of scrotal circumference in Red Angus. *Professional Animal Scientist* 24:128-135.
- Crews, D. H., Jr., R. M. Enns, J. M. Rumph, and E. J. Pollak. 2008. Genetic evaluation of retail product percentage in Simmental cattle. *J. Anim. Breed. Gen.* 125:13-19.
- Enns, R. M., and G. B. Nicoll. 2008. Genetic change results from selection on an economic breeding objective in beef cattle. *J. Anim. Sci.* 86: 3348-3357.
- Renken, W.J., L. D. Howery, G. B. Ruyle, R.M. Enns. 2008. Cattle generalize visual cues from the pen to the field to select initial feeding patches. *Applied Animal Behaviour Science* 109:128-140.

Abstracts and Proceedings:

- Brigham, B. W., R. M. Enns, R. L. Weaber, H. Van Campen, G. H. Loneragan, J. L. Salak-Johnson, C. C. L. Chase, J. J. Wagner, C. M. McAllister, and E. J. Pollak. 2008. Effect of processing stress on feedlot cattle sickness. *Journal of Animal Science. E-Supplement 2. Vol 86:593* (abstract).
- Crews, D. H., Jr. and R. M. Enns. 2008. Genetic improvement of heifer pregnancy and performance in beef cattle. *Proceedings, Robert E. Taylor Memorial Symposium (2008): Applied Reproductive Strategies in Beef Cattle, Fort Collins, CO.* pp 187-194.
- Crews, D. H., Jr., S. S. Moore, and R. M. Enns. 2008. Optimizing traditional and marker assisted evaluation in beef cattle. *Proceedings, 40th Beef Improvement Federation Research Symposium and Annual Meeting, Calgary, AB.* pp. 44-49.
- Enns, R. M. and D. H. Crews, Jr. 2008. New trait development and economic relevance in national cattle evaluation. *Proceedings, 40th Beef Improvement Federation Research Symposium and Annual Meeting, Calgary, AB.* pp. 40-43.
- Lewis, R. M., B. B. Lockee, M. S. Ames, R. M. Enns, J. M. Rumph, T. W. Wilkinson, and E. J. Pollak. 2008. Graduate education utilizing distance learning. *JAS E-supplement-1. 86:165* (abstract).
- Marquez, G. C., R. M. Enns, M. D. Grosz, and M. D. MacNeil. 2008. QTL with dominance effect affecting residual feed intake on BTA6. *Journal of Animal Science. E-Supplement 2. Vol 86:362* (abstract).
- McAllister, C. M., B. W. Brigham, R. M. Enns, R. L. Weaber, H. Van Campen, G. H. Loneragan, J. L. Salak-Johnson, C. C. L. Chase, J. J. Wagner, and E. J. Pollak. 2008. Effect of receiving weight on predicted days to onset of respiratory disease in feedlot steers. *Journal of Animal Science. E-Supplement 2. Vol 86:592* (abstract).
- Pepper, A. R., R. M. Enns, R. L. Weaber, H. Van Campen, G. H. Loneragan, J. L. Salak-Johnson, C. C. L. Chase, J. J. Wagner, and E. J. Pollak. 2008. The effect of exit velocity at receiving and re-implant on average daily gain and weight at re-implant. *Journal of Animal Science. E-Supplement 2. Vol 86:593* (abstract).
- Speidel, S. E., R. M. Enns, R. L. Weaber, H. Van Campen, G. H. Loneragan, J. L. Salak-Johnson, C. C. L. Chase, J. J. Wagner, C. M. McAllister, and E. J. Pollak. 2008. Effect of daily ambient temperature and wind speed on sickness of feedlot cattle. *Journal of Animal Science. E-Supplement 2. Vol 86:593* (abstract).

Weaber, R. L., R. M. Enns, H. Van Campen, G. H. Loneragan, J. L. Salak-Johnson, C. C. L. Chase, J. J. Wagner, and E. J. Pollak. 2008. Correlations among measures of temperament, weight and gain of steers at placement and reimplant in a commercial feed yard. *Journal of Animal Science*. E-Supplement 2. Vol 86:592 (abstract).

4. University of Nevada – Reno

Publications for 2008 and 2009

- Bigelow, J.P., W.M. Rauw, and L. Gomez-Raya. 2009. Observations concerning reproductive temperature requirements of captive Lahontan cutthroat trout. *North American Journal of Aquaculture* 71:252–255.
- Gomez-Raya L., K. Priest, W. M. Rauw, M. Okomo-Adhiambo, D. Thain, B. Bruce, A. Rink, R. Torell, L. Grellman, Narayanan, R, and C. Beattie. 2008. The value of DNA paternity identification for free range beef cattle in Nevada. *Journal of Animal Science*. 86: 17-24.
- Gomez-Raya L., M.S. Amoss, Y. Da, C. W. Beattie, D. Smith, O. Ash, and W. M. Rauw. 2009. Role of Inbreeding, Selection on the incidence of Cutaneous Malignant Melanoma in Sinclair Swine. *Journal of Animal Breeding and Genetics* 126:242–249.
- Gomez-Raya, L. 2008. A large family size is required to detect sexual heterogeneity of the recombination fraction using dominant and codominant DNA-markers. *Span Jour. Agric. Res.* 6:116-123.
- Gomez-Raya, L. Inferring unknown genotypes of sires at codominant deoxyribonucleic acid markers in half-sib families. 2009. *Journal of Animal Science* 87: 1872-1882.
- Lallias D., L. Gomez-Raya, C.S. Haley, I. Arzul, S. Heurtebise, A.R. Beaumont, P. Boudry, and S. Lapègue. 2009. Combining two-stage testing and interval mapping strategies to detect QTL for resistance to bonamiosis in the European flat oyster *Ostrea edulis*. *Marine Biotechnology* (in press).
- Robinson M.L., L. Gomez-Raya, W.M. Rauw, M.M. Peacock. 2008. Fulton's body condition factor K correlates with survival time in a thermal challenge experiment in juvenile Lahontan cutthroat trout (*Oncorhynchus clarki henshawi*). *Journal of Thermal Biology* 33:363– 368.
- W. M. Rauw, S. Hermes, K. Bunter, and L. Gomez Raya. 2009. The relationship between growth, mature and lactation food intake in a mouse model. *Livestock Science*. 123:249–254.
- W.M. Rauw (Ed.) 2009, "Resource Allocation Theory Applied to Farm Animal Production" CABI Publishing, Wallingford, UK .

ASAS Presentations 2009 and 2008

- Gomez-Raya. L. Construction of LD maps for SNPs linked to susceptibility loci (oral presentation). Joint ADSA-CSAS-ASAS Meeting. 2009, Montreal, Quebec, Canada. (oral presentation).
- J. P. Bigelow, M. M. Peacock, W. M. Rauw, and L. Gomez-Raya. Effects of female holding temperature and post-ovulatory oocyte ageing on egg survival in Pilot Peak Lahontan cutthroat trout, *Oncorhynchus clarki henshawi*. Joint ADSA-PSA-AMPA-ASAS Meeting. Indianapolis, Indiana. USA. 2008. (oral presentation).
- J. P. Bigelow, M. W. M. Rauw, M. Peacock, and L. Gomez-Raya. Effects of female holding temperature and post-ovulatory oocyte ageing on egg survival in Pilot Peak Lahontan cutthroat trout, *Oncorhynchus clarki henshawi*. Joint ADSA-PSA-AMPA-ASAS Meeting. Indianapolis, Indiana. USA. 2008. (oral presentation).
- J. P. Bigelow, W. M. Rauw, and L. Gomez-Raya. Acclimation to salinity and survival of Lahontan cutthroat trout *Oncorhynchus clarki*. Joint ADSA-CSAS-ASAS Meeting. 2009, Montreal, Quebec, Canada. (oral presentation).
- L. Gomez-Raya, M. Miller, C. S. Ho, V. Kirchoff, D. M. Smith, W. M. Rauw, D. Thain, A. Rink, and C. W. Beattie. Linkage disequilibria of the SLA region loci with malignant melanoma in Sinclair swine. Joint ADSA-PSA-AMPA-ASAS Meeting. Indianapolis, Indiana. USA. 2008. (oral presentation).

- L. Gomez-Raya, M. Miller, C. S. Ho, V. Kirchoff, D. M. Smith, W. M. Rauw, D. Thain, A. Rink, and C. W. Beattie. Linkage disequilibria of the SLA region loci with malignant melanoma in Sinclair swine. Joint ADSA-PSA-AMPA-ASAS Meeting. Indianapolis, Indiana. USA. 2008. (oral presentation).
- T. Wuliji, T. Borda, H. Glimp, L. Gomez-Raya, and W. Rauw. A single fleece test method improves premium wool traits in range sheep flock. Joint ADSA-PSA-AMPA-ASAS Meeting. Indianapolis, Indiana. USA. 2008. (poster presentation).
- W. M. Rauw, S. Hermesch, K. Bunter, and L. Gomez Raya, Relationship between feed intake during growth and lactation in a mouse model. Joint ADSA-PSA-AMPA-ASAS Meeting. Indianapolis, Indiana. USA. 2008. (oral presentation).
- W. M. Rauw, S. Hermesch, K. Bunter, and L. Gomez Raya. Relationship between feed intake during growth and lactation in a mouse model. Joint ADSA-PSA-AMPA-ASAS Meeting. Indianapolis, Indiana. USA. 2008. (oral presentation).

5. University of Wyoming

Refereed Publications:

- Alexander, B.M., P. Singh, K.J. Austin, R.R. Cockrum, K.M. Cammack, B.W. Hess, G.E. Moss, P.W. Nathanielsz, and S.P. Ford. 2008. Effect of maternal fatness on fetal steroids and semi-quantitative real-time PCR expression of receptor genes in sheep. *Anim. Reprod. Sci.*
- Cammack, K.M., E. Antoniou, L. Hearne, and W.R. Lamberson. 2009. Testicular gene expression in male mice divergent for fertility after heat stress. *Theriogenology*. 71:651-661.
- Cammack, K.M., M. Thomas, and M. Enns. 2009. Genetic analysis of reproduction traits in livestock: a review. *PAS*. Under review.
- Cockrum, R.R., K.A. Austin, P.A. Ludden, and K.M. Cammack. 2009. Effect of subacute dietary nitrate on production parameters in Suffolk ewes. *Animal*. Accepted.

Abstracts:

- Austin, K.J., R.R. Cockrum, A.M. Kaiser, and K.M. Cammack. 2009. Differential gene expression in the testis of adult male mice following treatment with Aflatoxin B1. *National ASAS*. Montreal.
- Cockrum, R.R., K.A. Austin, J.F. Taylor, P.A. Ludden, and K.M. Cammack. 2009. Effects of subacute dietary nitrate on production and gene expression in Suffolk ewes. *Midwest ASAS*. Des Moines, IA.
- Cockrum, R.R., K.A. Austin, K.L. Kessler, S.M. Rustemeyer, W.J. Murdoch, and K.M. Cammack. 2009. Breeding performance of Suffolk ewes administered subacute levels of dietary nitrate. *Western ASAS*. Fort Collins, CO. Kessler, K.L., K.C. Olson, C.L. Wright, K.J. Austin, P.S. Johnson, and K.M. Cammack. 2009. Effects of high-sulfur water and clinoptilolite on growth performance and gene expression of steers fed forage-based diets. *Midwest ASAS*. Des Moines, IA.
- Cockrum, R.R., K.A. Austin, P.A. Ludden, J.F. Taylor, J.W. Kim, S.C. Fahrenkrug, J.R. Garbe, and K.M. Cammack. 2009. Differential gene expression in Suffolk ewes exposed to subacute dietary nitrate. *National ASAS*. Montreal.
- Kessler, K.L., K.C. Olson, C.L. Wright, K.J. Austin, K. McInnerney, R.R. Cockrum, P.S. Johnson, and K.M. Cammack. 2009. Effects of high-sulfur water on growth performance and gene expression of steers fed forage-based diets. *National ASAS*. Montreal.
- Rustemeyer, S.M., W.R. Lamberson, D.R. Ledoux, and K.M. Cammack. 2009. Effects of dietary aflatoxin on performance of growing barrows. *National ASAS*. Montreal.

6. University of Arizona – V Bar V Ranch

Refereed Publications:

Bailey, C.R., G.C. Duff, S.R. Sanders, J.L. Treichel, L.H. Baumgard, J.A. Marchello, D.W. Schafer, C. P. Murphy. 2008. Effects of increasing crude protein concentrations on performance and carcass characteristics of growing and finishing steers and heifers. *Anim. Feed. Sci. & Tech.* 142 (2008) 111-120.

7. North American Limousin Foundation

Publications

Manuals

NALF. 2008. International Limousin Genetic Evaluation Manual. Fall ed. North American Limousin Foundation, Englewood, CO. Available: <http://www.nalf.org/programs/programs.html>.

NALF. 2008. International Limousin Genetic Evaluation Manual. Spring ed. North American Limousin Foundation, Englewood, CO.

Magazine Articles

Andersen, K. J., and L. R. Hyde. 2008. NALF announces genetic evaluation service provider. *Bottom Line*. Spring:5.

Andersen, K. J., and L. R. Hyde. 2008. NALF announces genetic evaluation service provider. *Limousin World*. April:106.

Andersen, K. J., and L. R. Hyde. 2008. Vision Quest 2 demonstrates Limousin, Lim-Flex carcass merit. *Limousin World*. January:18-20.

Hyde, L. R. 2008. Too high? Too low? Percentile tables help you decide. *Bottom Line*. Spring:15.

Hyde, L. R. 2008. Visions Quest brings instrument grading into focus. *Bottom Line*. Winter:12-13.
2009 Publications

Manuals

NALF. 2009. International Limousin Genetic Evaluation Manual. Spring ed. North American Limousin Foundation, Englewood, CO.

Magazine Articles

Hyde, L. R. 2009. Genetic trends demonstrate breed improvement. *Bottom Line*. Spring:11. Hyde, L.

R. 2009. Limousin breeders tackle temperament; genetic trend shows power of selection. *Bottom Line*. Winter:17,20.