Early and late births in high-latitude populations of free-ranging Bison (*Bison bison*)

Thomas S. Jung[1, *], Nicholas C. Larter[2], and Todd Powell[1]

[1]Department of Environment, Government of Yukon, P.O. Box 2703, Whitehorse, Yukon Y1A 2C6 Canada
[2]Department of Environment and Natural Resources, Government of Northwest Territories, P.O. Box 240, Fort Simpson, Northwest Territories X0E 0N0 Canada
[*]Corresponding author: thomas.jung@gov.yk.ca

Jung, T.S., N.C. Larter, and T. Powell. 2018. Early and late births in high-latitude populations of free-ranging Bison (*Bison bison*). Canadian Field-Naturalist 132(3): 219–222. https://doi.org/10.22621/cfn.v132i3.1983

Abstract

The timing of parturition in high-latitude populations of Bison (*Bison bison*) is not well documented, but previous observations have indicated that births do not start until mid-May and largely end in late June or early July, similar to those of other northern ungulates. In three high-latitude Bison populations in northwestern Canada, the onset of parturition occurred as early as late March and early April—5–6 weeks earlier than previously observed—and two isolated cases of late births occurred in mid-November and mid-December. Our observations suggest that the onset of parturition in high-latitude Bison can be earlier than previously known, and late births, while apparently rare, may occur. Determining whether our observations signal a substantial, lasting shift in the timing and, possibly, synchrony of parturition in high-latitude populations of Bison will require further monitoring for early-born calves.

Key words: Bison; *Bison bison*; calving; phenology; parturition

Introduction

The birthing season for ungulates living at high latitudes is short. In northern North America, parturition by most ungulates occurs within four weeks, beginning in mid-May, peaking in late May, and tapering off by mid-June (e.g., Adams and Dale 1998; Bowyer *et al*. 1998). Where the environment is distinctly seasonal, there is strong selection toward synchrony in births—both within and between species—likely in response to a short plant-growing season and, perhaps secondarily, predation pressure. Parturition outside this "birth pulse" is of interest (e.g., Rosatte and Neuhold 2006; Jacques *et al*. 2007) because it aids in better understanding plasticity in the timing of births (Keller *et al*. 2015), and it may be maladaptive if survival or fitness is compromised for early- or late-born animals (Estes 1976; Festa-Bianchet 1988).

Bison (*Bison bison*) are an apparent exception among northern ungulates in that parturition is thought to be asynchronous compared with that of sympatric ungulates (Rutberg 1984; Green and Rothstein 1993a); however, most data on the timing of parturition of Bison are from populations at lower latitudes (≤49°N). During a five-year study (1985–1989) in Badlands National Park, South Dakota, Berger and Cunningham (1994) recorded the onset of parturition by Plains Bison (*B. b. bison*) between 3 and 7 April, with a median birth date of 2–8 May. In Wind Cave National Park, South Dakota, Green and Rothstein (1993b) reported the first births of Bison on 4–7 April, peaking in late April or early May; although varying among years (n = 3; 1982–1984), the mean length of the birth season—defined as period over which 80% of births occurred—was 53.7 ± 10.2 (SE) days. In Yellowstone National Park, Wyoming, predicted parturition has varied widely among years and herds, with the onset occurring from 31 March to 12 April and 10–27 April for the Northern and Central herds, respectively (Gogan *et al*. 2005; Jones *et al*. 2010). The median date of parturition for these herds differed by 16 days (6 May and 22 May, respectively), indicating variation in the timing of births even among closely adjacent populations. In all of the above populations of Plains Bison, the length of the birthing season varied annually, but largely began in early April and concluded by mid- to late June. A few calves were born abnormally late, including into September for most studied populations of Plains Bison, and, in exceptional cases, into November in Wind Cave (Green and Rothstein 1993a) and Yellowstone (B. Pratt-Bergstrom pers. comm. January 2012) national parks.

Unfortunately, similar field data are not available for parturition dates of free-ranging Wood Bison (*B. b. athabascae*), which occur at high latitudes (>56°N), where seasonal constraints are more pronounced. Geographic variation in the timing of Bison parturition has been postulated, with the onset of parturition and median birth date later and synchronicity of births greater in northern than in southern populations (Berger and Cunningham 1994; Gogan *et al*. 2005). For mountain sheep (*Ovis* spp.), Bunnel (1982) observed a strong relation between latitude and the onset of parturition, with later dates of first births in more northern populations. Correspondingly, for Wood Bison, the onset of parturition in Wood Buffalo National Park, Alberta and Northwest Territories, was reported as 10 May (Soper 1941) and 12 May (Carbyn and Trottier 1987), notably, more

than a month later than observed for Plains Bison in the contiguous USA.

Anecdotal observations from our field surveys in northwestern Canada over the past ≥16 years concur that parturition by Wood Bison largely occurs at about the same time as that for sympatric ungulates, e.g., Caribou (*Rangifer tarandus*), Moose (*Alces americanus*), although it may start earlier, i.e., early May, and end later, i.e., late June, suggesting that the timing of forage availability, i.e., spring green-up, also strongly influences the timing of calving by Bison at high latitudes. Births outside this period have not been observed. Here, we document recent observations of unusually early- or late-born Bison calves from three reintroduced populations in northwestern Canada.

Observations

Our observations were from the Aishihik population in southwestern Yukon, Canada (Jung 2015; Jung *et al*. 2015), and the Nahanni and Nordquist populations, which occur at the nexus of the Northwest Territories, Yukon, and British Columbia, Canada (Jung 2017; Jung and Larter 2017), all located between 59°N and 61°N. These populations were monitored irregularly by wildlife management agency personnel during the parturition period. We used the description of coat colour changes in Bison calves provided by Olson (2005) to crudely estimate the parturition date of those born late.

Early-born calves

On 4 April 2013, we observed a calf from the Nahanni population, which was assumed born the previous day. In 2015 and 2016, we observed Bison calves from the Aishihik population, presumably born in early April (Table 1), with the earliest calf seen on 4 April 2016. Further, in the first week of April 2016 and 2017, lactating females that had recently been suckled were observed in the Aishihik population (Table 1). Based on a physical examination of the uterine tract of two lactating Bison shot during 4–6 April 2016, these females may have recently given birth. For a lactating female shot on 5 April 2017, the predicted birth date was possibly mid-March, based on measurements of the uterus. We note, however, that lactation itself is not unequivocal evidence that the female recently gave birth, as she may have been suckling her calf from the previous year.

TABLE 1. Observations of early- and late-born Bison (*Bison bison*) calves in northwestern Canada.

Observation date(s)	Observation	Population
Early-born calves		
4 April 2013	Newborn calf near Fort Liard, Northwest Territories. Birth occurred immediately after a late-season snow storm (F. Bertrand pers. comm. April 2013). Date of parturition assumed to be 3 April.	Nahanni
27–29 April 2015	Several dozen small, reddish calves in mixed cow–calf groups during aerial surveys near Haines Junction, Yukon (R. Drummond and R. Oborne pers. comm. April 2015). Date of parturition unknown, but assumed to be early or mid-April.	Aishihik
4–6 April 2016	Several newborn calves during aerial surveys for Bison near Haines Junction, Yukon (R. Drummond and R. Oborne pers. comm. April 2016). On 4 April 2016, we observed two harvested adult female Bison from the same area that were lactating. The onset of parturition is assumed to be earlier than 4 April.	Aishihik
4–6 April 2017	Aerial surveys for Bison in the same area as in 2015 and 2016 near Haines Junction, Yukon, did not show any calves. However, on 4 and 5 April 2017, we observed two harvested adult female Bison from the same area that were lactating. Based on a physical examination of the uterine tract, onset of parturition was estimated to be 28 March for one bison (M. Vanderkop pers. comm. April 2017).	Aishihik
Late-born calves		
17 March 2005	Reddish-brown calf in a group of 11 Bison near Haines Junction, Yukon (D. Drummond pers. comm. March 2005), noticeably smaller than other calves in the area. Based on Olson (2005), we estimated that the calf was probably 10–13 weeks old when observed and, thus, likely born in mid-December.	Aishihik
7 January 2012	Small calf with a reddish coat in a group of 26 Bison near Liard River, British Columbia, about 30–40% the size of seven other calves in the group. Based on descriptions of size and colouration and photographs provided by Olson (2005), we estimate that the calf was probably 8–10 weeks old when observed and, thus, was born in early to mid-November.	Nordquist

Late-born calves

Bison born late were rarely recorded; however, we documented two instances from two populations in northwestern Canada (Table 1). These calves were substantially smaller than other calves observed, and pelage colour also differed. Based on descriptions of size and colouration and photographs provided by Olson (2005), we estimate that these calves were born in mid-December and early to mid-November (Table 1).

Discussion

Our observations provide evidence of parturition in early April, and possibly as early as late March, in at least two high-latitude populations of Wood Bison—5–6 weeks earlier than that reported from Wood Buffalo National Park (Soper 1941; Carbyn and Trottier 1987) and earlier observations for the Aishihik and Nahanni populations by wildlife management agency biologists and conservation officers.

It is uncertain whether the earlier onset of parturition that we observed has occurred previously and gone unnoticed or if there has been a shift in the date of first births in recent years. We believe that the latter is more plausible, given that observations of Bison in late March and April by wildlife management agency personnel, Bison hunters, and local residents have not included any reports of calves born earlier than May before 2013. Detailed studies of the timing of parturition in Plains Bison in more southern latitudes (Green and Rothstein 1993a; Berger and Cunningham 1994; Gogan *et al.* 2005) and other ungulates, e.g., Thinhorn Sheep (*Ovis dalli*; Rachlow and Bowyer 1991) provide evidence of annual variation that may exceed 2–3 weeks. Moreover, the onset of parturition in Bison at Yellowstone National Park has shifted from late March to mid-April over 55 years from 1941 to 1997 (Gogan *et al.* 2005; Jones *et al.* 2010), demonstrating that changes in the timing of parturition for Bison can occur over longer time scales. Whether the early births we observed indicates a shift in the timing of parturition in Bison from the Aishihik population is unknown; showing this would require further monitoring for early-born calves.

Although the onset of parturition in southern populations of Plains Bison normally occurs around early April to match the phenology of food availability (see Introduction), early births in the Aishihik and Nahanni populations have occurred while temperatures were below freezing at night and patches of snow persisted on the ground, indicating a mismatch between early births and spring green-up of forage resources. Generally, calves born earlier in the season may have an advantage over their cohorts that may last their lifetimes (Festa-Bianchet 1988), but those born early in suboptimal conditions, possibly because their mothers were in poor body condition, may not have an advantage (Berger and Cunningham 1994). In the latter case, the prognosis for their survival is poor.

Similarly, the fate of late-born Bison is unknown. However, the late-born calves observed had both survived the critical neonatal period (i.e., the first month after being born) during early winter at high latitudes, indicating that they may survive the rest of the winter. In other instances of late-born calves, it has been assumed that the mother was in poor physical condition during the peak of conception and bred later in the season when her body stores had increased. However, the fate of these early- and late-born Bison is unknown.

In conclusion, our observations are of scientific interest because they provide new information on apparently extreme birth dates for high-latitude Bison, and they demonstrate some flexibility in the onset of parturition in these populations. It appears that parturition at high latitudes may begin in late March and, in exceptional cases, extend into December. Overall, however, the timing of parturition for Bison appears to be largely synchronous with spring green-up, albeit with a wider range of dates than for other ungulates in the region.

Acknowledgements

We thank Dan Drummond, Ryan Drummond, Russel Oborne, and Mary Vanderkop (Government of Yukon) and Floyd Bertrand (Government of Northwest Territories) for sharing observations of early- and late-born Bison calves in northwestern Canada, and Beth Pratt-Bergstrom (National Wildlife Federation, California Regional Center) for the same from Yellowstone National Park. Marco Festa-Bianchet, David Nagorsen, Dwayne Lepitzki, and an anonymous reviewer kindly provided comments that improved this note. This work was supported by the Government of Yukon and the Government of the Northwest Territories.

Literature Cited

Adams, L.G., and B.W. Dale. 1998. Timing and synchrony of parturition in Alaskan caribou. Journal of Mammalogy 79: 287–294. https://doi.org/10.2307/1382865

Berger, J., and C. Cunningham. 1994. Bison: Mating and Conservation in Small Populations. Columbia University Press, New York, New York, USA.

Bowyer, R.T., V. Van Ballenberghe, and J.G. Kie. 1998. Timing and synchrony of parturition in Alaskan moose: long-term versus proximal effects of climate. Journal of Mammalogy 79: 1332–1344. https://doi.org/10.2307/1383025

Bunnel, F.L. 1982. The lambing period of mountain sheep: synthesis, hypotheses, and tests. Canadian Journal of Zoology 60: 1–14. https://doi.org/10.1139/z82-001

Carbyn, L.N., and T. Trottier. 1987. Responses of bison on their calving grounds to predation by wolves in Wood Buffalo National Park. Canadian Journal of Zoology 65: 2072–2078. https://doi.org/10.1139/z87-317

Estes, R.D. 1976. The significance of breeding synchrony in the wildebeest. East African Wildlife Journal 14: 135–152. https://doi.org/10.1111/j.1365-2028.1976.tb00158.x

Festa-Bianchet, M. 1988. Birthdate and lamb survival in bighorn lambs (*Ovis canadensis*). Journal of Zoology 214: 653–661. https://doi.org/10.1111/j.1469-7998.1988.tb03764.x

Gogan, P.J.P., K.M. Podruzny, E.M. Olexa, H.I. Pac, and K.L. Frey. 2005. Yellowstone bison fetal development and phenology of parturition. Journal of Wildlife Management 69: 1716–1730. https://doi.org/10.2193/0022-541X(2005)69[1716:YBFDAP]2.0.CO;2

Green, W.C.H., and A. Rothstein. 1993a. Asynchronous parturition in bison: implications for the hider–follower dichotomy. Journal of Mammalogy 74: 920–925. https://doi.org/10.2307/1382430

Green, W.C.H., and A. Rothstein. 1993b. Persistent influences of birth date on dominance, growth, and reproductive success in bison. Journal of Zoology 230: 177–186. https://doi.org/10.1111/j.1469-7998.1993.tb02680.x

Jacques, C.N., W.E. Ishmael, T.R. Van Deelen, and R.E. Rolley. 2007. A late-born White-tailed Deer, *Odocoileus virginianus*, fawn in southcentral Wisconsin. Canadian Field-Naturalist 121: 333–335. https://doi.org/10.22621/cfn.v121i3.487

Jones, J.D., J.J. Treanor, R.L. Wallen, and P.J. White. 2010. Timing of parturition events in Yellowstone bison, *Bison bison*: implications for bison conservation and brucellosis transmission risk to cattle. Wildlife Biology 16: 333–339. https://doi.org/10.2981/09-082

Jung, T.S. 2015. Winter diets of reintroduced bison (*Bison bison*) in northwestern Canada. Mammal Research 60: 385–391. https://doi.org/10.1007/s13364-015-0240-2

Jung, T.S. 2017. Extralimital movements of reintroduced bison (*Bison bison*): implications for range expansion and human–wildlife conflict. European Journal of Wildlife Research 63: 35. https://doi.org/10.1007/s10344-017-1094-5

Jung, T.S., and N.C. Larter. 2017. Observations of long-distance post-release dispersal by reintroduced bison (*Bison bison*). Canadian Field-Naturalist 131: 221–224. https://doi.org/10.22621/cfn.v131i3.1825

Jung, T.S., S.A. Stotyn, and S.M. Czetwertynski. 2015. Dietary overlap and the potential for competition in a dynamic ungulate community in northwestern Canada. Journal of Wildlife Management 79: 1277–1285. https://doi.org/10.1002/jwmg.946

Keller, B.J., A.D. Bleisch, J.J. Millspaugh, C.P. Lehman, J.J. Kragel, L.P. Hansen, J. Sumners, M.A. Rumble, and G.C. Brundige. 2015. Extended duration of parturition season in North American elk (*Cervus elaphus*). American Midland Naturalist 173: 162–167. https://doi.org/10.1674/0003-0031-173.1.162

Olson, W. 2005. Portraits of the Bison: an Illustrated Guide to Bison Society. University of Alberta Press, Edmonton, Alberta, Canada.

Rachlow J.L., and R.T. Bowyer. 1991. Interannual variation in timing and synchrony of parturition in Dall's sheep. Journal of Mammalogy 72: 487–492. https://doi.org/10.2307/1382131

Rosatte, R., and J. Neuhold. 2006. Late-born Elk, *Cervus elaphus*, calf observed near Bancroft, Ontario. Canadian Field-Naturalist 120: 188–191. https://doi.org/10.22621/cfn.v120i2.286

Rutberg, A.T. 1984. Birth synchrony in American bison (*Bison bison*): response to predation or season? Journal of Mammalogy 65: 418–423. https://doi.org/10.2307/1381088

Soper, J.D. 1941. History, range and home life of the northern bison. Ecological Monographs 11: 347–412. https://doi.org/10.2307/1943298

Received 28 July 2017
Accepted 19 October 2017