

Does chiropractic correction of atlas and pelvic asymmetry in twin-bearing ewes influence interventions and lamb birthweights

Authors: Tarling L.,¹ Davidson V.,² Charlton S.²

Affiliations: ¹McTimoney Animal Association/Private Practice Oxon, Berks, Bucks

²McTimoney College of Chiropractic, Abingdon, Oxon, OX14 1BZ

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Application: Informing McTimoney practitioners, veterinarians and farmers about the potential benefits for improved lamb survival and ewe welfare following manual chiropractic treatment of ewes during the third trimester of pregnancy.

Introduction Lambing often involves intervention, creating welfare implications. In humans, misalignment at the first cervical vertebra (C1)-can compromise cerebral spinal fluid (CSF) flow (Woodfield *et al.* 2015). C1 misalignment can also disrupt cortical functioning (Kelly *et al.* 2000) and blood pressure (Bakris *et al.* 2007). Thus, C1 misalignment could be implicated in dystocia by affecting correct neural and hormonal regulation. Hypertension during human pregnancy also influences foetal growth (Ananth *et al.* 1995), and correction of C1 misalignment can reduce blood pressure for eight weeks (Bakris *et al.* 2007). Mortality rates, pre-term and small-for-gestational-age births increase twofold in dichorionic twin pregnancies with foetal birthweight disparity in humans, compared to those without (Reforma *et al.* 2022).

Manual chiropractic is a gentle, whole-body manipulation technique which aims to mobilise restricted joints, primarily in the spine and pelvis, using only the hands to apply high-velocity, low amplitude adjustments (Haussler *et al.* 2021). This research aims to investigate if the presence and correction of atlas and pelvic asymmetry in ewes lambing twins affects dystocia, intervention grade and birthweights.

Materials and Methods: This randomised control interventional study assessed 44 (4-5 years) Suffolk cross ewes carrying twins, sired by two rams, eight weeks before lambing. All Subjects were palpated for asymmetry at C1, specifically dorsal/ventral rotation, and pelvic asymmetry (dorsal/ventral rotation and caudal/cranial tilt). Group A (n=23) received manual chiropractic adjustment of C1 (n=11) and or pelvis (n=14), whereas Group B (n=21) received none. At lambing, intervention (graded 1-5), and birthweight were recorded. Datasets assessed for normality (Shapiro wilk). Spearman's ranked coefficient, Mann-Whitney U test and paired t-tests analysed datasets. Statistical significance $P < 0.05$.

Results: Results indicate a significant positive relationship between C1 misalignment and intervention grade ($r_s(40) = 0.34, P = 0.02$) however, no significant relationship was found between pelvic misalignment and intervention grade ($r_s(40) = -0.07, P = 0.64$). There were fewer cases of dystocia requiring intervention in Group A (42%) compared to Group B (53%), with no significant difference between the groups ($U=1019, Z=0.52, P = 0.61, N_1=23, N_2=21$). Lamb birthweight showed no relationship with the need for intervention when comparing individual lamb birthweights: Group A ($r_s(44) = 0.13, P = 0.39$) Group B ($r_s(40) = 0.23, P = 0.15$) or, when comparing combined twin birthweights: Group A ($r_s(21) = 0.13, p = 0.57$), Group B ($r_s(19) 0.31, P = 0.18$). Group B mean birthweight was similar to Group A (Table 1). However, Group A's first born lambs' birthweight ($M=5.1\text{kg}, SD 0.69$) compared to their second born lambs' birthweight ($M=5.1\text{kg} (SD =0.85)$) showed minimal birthweight disparity between twins with no significant difference, $t(44) =0.03, P = 0.97$. In contrast, Group B's demonstrated a significant difference $t(40) =2.97, P = 0.004$ in birthweight disparity between twins: their first-born lambs' birthweight ($M=5.4\text{kg}, SD = 0.41$) compared to their second born lambs' birthweight ($M=4.9\text{kg}, SD=0.56$).

Table. 1 Birthweights(kg) (mean $\pm$ s.d) of twin lambs born to ewes with chiropractic(A) or without(B) treatment, 8 weeks prior to lambing

	Lamb 1 Birthwt	Lamb 2 Birthwt	<i>P</i> value	Mean Lamb Birthwt	Combined Twin Birthwt
Group A (n=46)	5.1 $\pm$ 0.69 ^a	5.1 $\pm$ 0.85 ^a	0.97	5.1 $\pm$ 0.76	10.3 $\pm$ 1.21
Group B (n=42)	5.4 $\pm$ 0.41 ^a	4.9 $\pm$ 0.56 ^b	0.004	5.2 $\pm$ 0.53	10.4 $\pm$ 0.65

Means within a row with different superscripts(a,b) differ significantly ($P < 0.01$).

Conclusions: Positive evidence that chiropractic adjustment eight weeks prior to lambing can reduce birthweight disparity between twins. Manual chiropractic adjustment of C1, administered during the third trimester of pregnancy, may reduce the grade of interventions associated with dystocia during lambing. Findings from this novel preliminary work suggests further studies with larger cohorts and across lambing seasons would be beneficial.

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