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Stillbirth in dairy calves is influenced independently by dystocia and body shape

A.C. Barrier a*, C. Mason a, C.M. Dwyer a, M.J. Haskell a, A.I. Macrae b

a SAC (Scottish Agricultural College), King’s Buildings, West Mains Road, Edinburgh, EH9 3JG, UK
b Dairy Herd Health and Productivity Service, Division of Veterinary Clinical Sciences, Royal (Dick) School of Veterinary Studies and the Roslin Institute, University of Edinburgh, Easter Bush Veterinary Centre, Roslin, Midlothian, EH25 9RG, UK

* Corresponding author. Tel.: +44 131 651 9307
Email address: alice.barrier@sac.ac.uk (A.C. Barrier).
Abstract

Perinatal mortality in dairy calves may cost the UK dairy industry over £60 million annually. Difficult birth is the main contributor to stillbirth. In the first study, gross post-mortem examinations were carried out on 20 stillborn calves (born dead) that were either unassisted at birth (n=10) or farmstaff-assisted but normally presented (FN: n=10). Half of all stillborn calves had breathed. Petechiae, haemorrhages and brain congestion were present in both assisted and unassisted births but greater trauma and bruising, was only seen in assisted calves. Body length, birth weight and thyroid:body weights ratios were not different (P>0.05).

The second study investigated if the size and conformation of calves born with various degrees of birth difficulty was related to surviving birth. Birth weight, length, height, girth, body mass indices (BMI) and ponderal indices (PI) were monitored in 490 calves (unassisted, N: n=375; FN: n=98; FM, farmstaff-assisted, malpresented calf: n=18; V, veterinary assistance, n=5). Regardless of birth difficulty, stillborn calves were longer and had lower BMI and PI than calves born alive (P<0.05), suggesting prenatal factors contributed to their postnatal survivability. FN calves were heavier than unassisted calves (P<0.05), and both FN and FM calves had lower PI than N calves (P<0.05).

Relying solely on the presence of haemorrhages, bruising, petechiae and brain congestion at gross post-mortem was not sufficient to characterise dystocial calves. Half of the stillborn calves had breathed, lived and therefore may have incurred a welfare cost. Body characteristics were related to stillbirth independently of dystocia. This is likely to reflect inadequate prenatal development leading to stillborn calves.
Keywords: calving ease, postmortem, survival, ponderal index, body mass index

Introduction

Worldwide, perinatal mortality of dairy calves varies from 2 to 10% (Mee et al., 2008). As many as 8% of dairy calves die in the first 48 hours in the United Kingdom (Esslemont and Kossaibati, 1996; Wathes et al., 2008; Brickell et al., 2009b), with mortality rates in the Holstein breed estimated at 11.6% and 4.3% from first and later parity dams respectively (Eaglen et al., 2011). The cost of stillbirth to the dairy industry is large. Estimates a decade ago were of as much as US$125\(^1\) million a year in the United States (Meyer et al., 2001), and of £60 million yearly to the UK dairy industry (DEFRA, 2003) and are unlikely to have decreased.

Ninety percent of calves that die perinatally are alive at the start of the calving process (Mee, 2008b; 2008c), emphasising how critical the birth process can be. Difficulty at birth, or dystocia (as assessed by the amount of assistance provided at birth) contributes to up to half of the perinatal mortality in cattle (Meyer et al., 2001; Berglund et al., 2003; Eriksson et al., 2004). Assisted deliveries themselves account for 10% to 50% of the calvings in dairy cows (Mee, 2008a).

There are multiple risk factors and underlying reasons for stillbirth in dairy cattle as reviewed by Meijering (1984) and Mee (2008c). With regards to dystocial stillbirths,

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\(^1\) 1 US$ = UK£0.63, €0.75 at 27 March 2012
these mainly result from trauma and anoxia (Mee, 2008c). Assisted deliveries may result in haemorrhages, injuries to the central nervous system and increases risk of rib and leg fractures in newborns and pelvic fractures in dams (Wilsmore, 1986; Aksoy et al., 2009). Published studies involving necropsies of stillborn calves are usually aimed at determining the cause of death of those calves (e.g., Berglund et al., 2003; Mee, 2010; Waldner et al., 2010). However, because of their diagnostic purposes, they do not report on the occurrence of specific injuries in relation to the dystocial or eutocial status of the stillborn calves.

Although a significant proportion of dystocial dairy calves are stillborn, a proportion of them still survive the birth process. It has been reported that calves born with and without birth difficulty usually differ in terms of their size and conformation (Johanson and Berger, 2003; Kolkman et al., 2010; Becker et al., 2011). It is however unknown if calf conformation could also determine whether a dystocial calf will be dead or alive at birth.

The objective of this study was to determine if dystocial stillborn calves (as assessed by assistance at birth) present specific pathology compared to eutocial stillborn calves, and whether the dystocial calves that are stillborn differ in their shape from the dystocial calves that survive. The first study aimed at gathering descriptive data on the specific pathologies occurring in calves born dead following birth difficulty. The second study investigated the body weight and conformation of calves born with various degrees of difficulty, born alive or dead.
Materials and methods

Animals, housing and management

The study was conducted at the Crichton Royal Farm (Dumfries, UK), in accordance with UK Home Office regulations (project licence PPL 60/3361). As part of a long-standing on-going trial on the farm, cows and their respective calves were from two genetic lines (S: either selected towards greater milk fats and proteins, or C: towards the rolling UK average). Adult cows from each group were kept under different diets (non trial, low forage or high forage) during lactation and dry periods (Bell and Roberts, 2007).

Calving was managed by experienced farm staff, as described in Barrier et al. (2012). Cows were assisted when judged to be in difficulty, and assistance was therefore used as a proxy measure for birth difficulty. Scores of birth difficulty were: N (no assistance), FN (Farmstaff assistance, Normal presentation of calf), FM (Farmstaff assistance, Malpresented calf), and V (Veterinary assistance including caesarean sections and foetotomy). Malpresentation was defined as any deviation from an anterior, dorsal presentation with both front limbs and head extended in the birth canal (normally presented calf). Any calf receiving any kind of assistance (score other than N) was considered as having experienced a difficult birth (or being a dystocial calf).
Study 1: Post-mortem examination of stillborn calves born with/without birth difficulty

Calves description

Twenty purebred Holstein calves, born at term (gestation length > 370 days) from various degrees of birth difficulty that were born dead (stillborn, as recorded by farm staff) between August 2009 and September 2010 were sent for post-mortem examination (N: n=10; FN: n=10). The dataset contained two twin calves, a bull (FN) and a heifer born (N) from two distinct pairs. There were 7 bull and 3 heifer calves in each N and FN group. 11 out of 20 stillborn calves were from primiparous dams but stillborn calves from primiparae were more prevalent in the FN calves (8 out of 10) than in the N calves (3 out of 10). Two and 4 calves were from the S genetic line in the N and FN calves respectively.

Post-mortem examinations

Gross post-mortem examinations were carried out by two veterinary surgeons from the SAC Disease Surveillance Centre (UKAS accredited, Dumfries, UK) using the same protocol usually no later than 24h after death of the calf. Firstly, calves were weighed and their crown-rump length was measured. Lungs were checked for signs of inflation as determined by whether or not lung tissue sample floats in water. The carcass was checked for presence of meconium stains, and presence, extent and location of petechiae (small blood spots due to rupture of capillary vessels), bruising (bleeding in the
interstitial tissues, small: size of a fingerprint; large: at least the size of the palm of a hand), haemorrhages (small; large), fractures, congestion of the brain and any other obvious abnormalities. Any petechiae, bruising or haemorrhage will thereafter be referred to as lesions. The weight of the thyroid was also noted and the ratio between thyroid and body weight was calculated to indicate potential iodine deficiency. There were four missing records for crown-rump lengths of the calves (3 FN; 1 N) and for thyroid weights (2 FN; 2 N), later considered as missing values.

Data analysis

Two sample T-tests were used to compare the calves’ birth weight, length and thyroid/body weight ratios between the two groups of calves using Minitab (Minitab 15 (2006, Minitab Ltd, UK).

Study 2: Incidence of stillbirth and the body characteristics of calves born dead and following birth difficulty.

Birth records of the calves

Full term purebred, non-deformed calves born between Sept 2008 and July 2010 were enrolled in the study (n=490), of which 23.5% of the calves had experienced assistance. For each calf, the following characteristics were noted: life status at birth (born alive, born dead), twinning (single or twin), sex of the calf, parity of the dam
(primiparous; multiparous), genetic line of the calf, diet of the dam during her pregnancy (non trial, low forage, high forage), sire and dam of the calf, the season born (summer: April to September; winter: October to March) or month of birth and year of birth.

**Body characteristics of the calves at birth**

All calves (born alive or dead) were weighed at birth (BW; kg) using a calibrated mechanical scale, measured for crown-rump length (CRL: supine length from the crown of the head to the base of the tail; cm) and heart girth (girth; cm) using the same flexible tape measure, and were measured for their height at withers (height; cm) using a height stick (Swali et al., 2008; Brickell et al., 2009a). Up to four recorders took the measurements and were trained to achieve consistency in measurements. For each calf, the ponderal index (PI) and body mass index (BMI) was calculated as being weight/CRL³ (kg/m³) and weight/CRL² (kg/m²) respectively.

**Statistical analysis**

The effect of birth difficulty on the life status of the calf at birth (born alive, born dead) was analysed using a Fisher exact test (grouping all scores of difficulty together).

The body characteristics of the 490 calves (BW, CRL, girth, height, BMI and PI) were analysed with REML (REstricted Maximum Likelihood) in Genstat 11th Edition (2008, VSN International Ltd, UK), using a forward-stepwise technique. Calf characteristics and the identity of the recorder were tested independently as univariates and became potential candidates for the multivariate model as described in Haskell et al. (2009). Calf identity
nested within sire of the calf was used as a random model. Unless otherwise stated hereafter, all the models included recorder, twinning, parity, sex of the calf, the interaction between year and season, birth difficulty and stillbirth. Recorder was not included in the final analysis of BW. An interaction between twinning and genetic line was fitted for analysis of BW and girth. Twinning was not included for the analysis of PI. An interaction between parity and sex of the calf was fitted to the analysis of CRL, PI and BMI. The interaction between year and season was not included for the analysis of CRL and height. In the latter, only year of birth was included. Finally, an interaction was fitted between birth difficulty and genetic line for CRL and girth.

Results

Study 1: Post mortem examination of stillborn calves born with/without birth difficulty

There was no difference in the birth weights, crown-rump lengths and thyroid/body weight ratios between stillborn calves born with or without assistance (P>0.05; Table 1)

Table 2 shows that only one calf (1 N) had traces of meconium visible at the macroscopic level and none of the calves examined had obvious fractures. Regardless of level of assistance, half of the calves (6 N, 4 FN) examined had breathed as evidenced by inflated lungs. Bruising was only reported in the assisted calves (4 out of 10) including
two with significant bruising. When petechiae were detected (4 N, 3 FN), this was found mostly on the parietal pleura regardless of assistance, with the exception of one FN calf that also had petechiae on the adjacent organs (thymus and heart). In terms of displaying lesions (in total seen in 12 calves out of 20), only calves born without assistance had lesions on the legs whereas both assisted and unassisted calves had lesions in the thoracic region and around the neck.

Study 2: Incidence of stillbirth and the body characteristics of calves born dead and following birth difficulty.

In this study, 7% (n=35) of the calves were born dead, of which 57.1% (n=20) had experienced assistance at birth. 4% (n=15) of the N calves, 10.8% (n=10) of FN calves, 27.8% (n=5) of the FM calves, and 100% (n=5) of the V calves were stillborn. Being born dead was more likely for assisted calves than for calves born without assistance (P<0.001).

There was no significant interaction between birth difficulty and life status at birth on any of the body characteristics considered (P>0.05). This means that body characteristics of assisted calves did not influence stillbirth.

Overall, calves born dead were longer and had lower BMI and PI than calves born alive (Table 3; P<0.001). They were taller and larger when considering a 90% confidence
interval (Table 3; \(P<0.10\)) but birth weights were not significantly different (Table 3; \(P>0.05\)).

FN calves weighed more at birth than calves born without assistance (+1.7kg; \(P<0.01\); Table 4) but this was not the case for FM and V calves. There was no difference in height, girth and BMI between calves born with or without difficulty. However, in the C genetic line, FN calves were longer than N calves (+3.9cm; Table 4; \(P<0.05\)) but this was not the case for other scores of birth difficulty and for calves from the S line. PI was also lower in FN and FM calves than in N calves (-5.2kg.m\(^{-3}\) and –7.5kg.m\(^{-3}\) respectively; Table 4; \(P<0.05\)).

**Discussion**

Stillborn calves (born dead) born from assisted and unassisted deliveries had similar weight and measurements. Petechiae, haemorrhages and brain congestion were present in assisted as well as in unassisted births and therefore were not specific indicators of birth assistance in this study. Relying solely on the presence of such criteria when conducting gross post-mortem examinations may not be sufficient to characterise dystocial calves. Only assisted calves showed the presence of large bruises and a greater proportion of them displayed haemorrhages. This implies that the extent of foetal stress and trauma was greater in cases of dystocia. There was no enlargement of the thyroid in any calf, suggesting no iodine deficiency led to calf mortality. It is surprising that only
one calf had traces of meconium (indicative of intra-uterine stress) but it is possible that in some cases it had washed away following licking from the dam. There was no report of fractures in the assisted calves contrary to previous reports (Aksoy et al., 2009), probably because excessive force was not applied during extraction of the calves.

Half of the calves had inflated lungs and therefore must have breathed despite having been reported as born dead. Those calves were alive after delivery, may have reached consciousness levels and therefore the ability to suffer (Mellor and Stafford, 2004). Thus, dystocia may be an underestimated welfare cost for animals dying shortly after birth.

There was a higher proportion of stillborn calves following birth difficulty, similarly to previous studies (Chassagne et al., 1999; Johanson and Berger, 2003; Lombard et al., 2007). Assisted calves that were stillborn had similar body characteristics to assisted calves that survived, meaning that body conformation of dystocial calves was unrelated to surviving birth. However, body conformation was related to surviving birth and to being assisted.

FN calves were heavier at birth than N calves, in accordance with increasing birth weight associated with higher risk of dystocia (Johanson and Berger, 2003). This was not the case for malpresented calves and veterinary assisted calves, probably as a result of a different aetiology for birth difficulty compared to FN calves. FN calves were also 4 cm longer than N calves but this was seen only for calves from the C genetic line. This
represents an increase in length of only 4.5%, which might not be biologically relevant in terms of the increased difficulty of the dam to expel the calf during the birth process. Furthermore, shoulder and thorax widths rather than length are critical factors for foeto-pelvic incompatibility (Becker et al., 2011), and heart girth did not differ in the present study between assisted and unassisted calves.

Calves born dead had a similar weight to calves born alive, but they were approximately 4 cm longer. It is possible that in calves that are longer in shape, the umbilical cord may rupture earlier or be clamped for longer during the birth process, ultimately leading to higher risk of stillbirth due to hypoxia. Stillborn calves also had lower Ponderal and Body Mass Indices than calves born alive. This means that calves born dead were relatively longer and thinner compared to calves born alive. This result is in accordance with a previous study on piglets, where longer length, lower PI and BMI were the best predictors of stillbirth (Baxter et al., 2008).

Ponderal and Body Mass Index are measures of both weight and length simultaneously, and therefore relate to the body conformation of the animal. Human neonatal research has studied how weight changes relative to length during the gestation period (Gluckman and Hanson, 2005). This can indicate cases when intra-uterine growth is not achieved to its potential (intra-uterine growth retardation) and growth asymmetry (as opposed to allometry) is observed.
Impaired foetal growth occurs when the foetal environment is not optimal. Its main cause is a compromised nutrient transfer between the foetus and its mother, also known as placental insufficiency but can also be due to inadequate maternal nutrition or maternal stresses that decrease the blood flow in the placenta and hence nutrient delivery. Impaired foetal and foetal organ development is known to have implications for immediate survival at birth but can also affect subsequent growth and development, morbidity and mortality (Bertram and Hanson, 2001). The present study therefore suggests that an altered foetal growth trajectory could have contributed to stillbirth. In those calves, impaired foetal development translated into a poorer ability to transition successfully to postnatal life and to survive the birth process.

FN calves and FM from the C genetic line had lower Ponderal Indices at birth regardless of them surviving the birth process, but without any difference in Body Mass Index. It is not clear why lower PI was seen in those calves.

Conclusion

Half of the calves recorded as stillborn had lived to some extent after birth, and this may have led to a welfare cost for them. Calves born dead after a difficult birth (as assessed by assistance) did not show evidence of specific trauma, but displayed larger lesions than stillborn calves born naturally, suggesting greater trauma. Relying solely on the presence of haemorrhages, bruising, petechiae and brain congestion when conducting gross post-mortem examinations may not be sufficient to characterise dystocial calves.
The shape of assisted calves did not differ between calves that survived the birth process and calves that did not. Calves born dead, however, were longer and thinner than calves born alive, which may be associated with inadequate prenatal calf development.

**Conflict of interest statement**

None of the authors has any financial or personal relationships that could inappropriately influence or bias the content of the paper.

**Acknowledgements**

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**References**


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Table 1

Birth weight, CRL, and thyroid/bodyweight ratio of purebred Holstein calves born dead without birth assistance (N; n=10) and born dead with after farmer assistance with calves normally presented (FN; n=10).

<table>
<thead>
<tr>
<th></th>
<th>N (n=10)</th>
<th>FN (n=10)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birth weight (kg)</td>
<td>43.3 ± 1.8</td>
<td>41.5 ± 1.4</td>
<td>n.s</td>
</tr>
<tr>
<td>CRL (cm)(^a)</td>
<td>96.8 ± 2.8</td>
<td>94.4 ± 2.2</td>
<td>n.s</td>
</tr>
<tr>
<td>Thyroid/body weight (g/kg)(^b)</td>
<td>0.38 ± 0.02</td>
<td>0.41 ± 0.03</td>
<td>n.s</td>
</tr>
</tbody>
</table>

n.s: P>0.05; \(^a\): N: n=9; FN: n=7; \(^b\): N: n=8; FN: n=8
Table 2

Number of purebred Holstein calves born dead without birth assistance (N; n=10) and born dead or with farmer assistance at birth, normal presentation of the calf (FN; n=10) that showed the described conditions upon gross post-mortem examination.

<table>
<thead>
<tr>
<th>Condition</th>
<th>N (n=10)</th>
<th>FN (n=10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inflated lungs</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>Meconium staining</td>
<td>1</td>
<td>.</td>
</tr>
<tr>
<td>Petechiae (n=7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parietal pleura</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Left axilla</td>
<td>.</td>
<td>1</td>
</tr>
<tr>
<td>Organs (thymus, heart)</td>
<td>.</td>
<td>1</td>
</tr>
<tr>
<td>Small bruising</td>
<td>Ribs</td>
<td>.</td>
</tr>
<tr>
<td>(n=2)</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Large bruising</td>
<td>Left axilla</td>
<td>.</td>
</tr>
<tr>
<td>(n=6)</td>
<td>Right thoracic wall</td>
<td>1</td>
</tr>
<tr>
<td>Small haemorrhages</td>
<td>Ribs</td>
<td>.</td>
</tr>
<tr>
<td>(n=6)</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Large haemorrhages</td>
<td>Right thorax</td>
<td>1</td>
</tr>
<tr>
<td>(n=6)</td>
<td>Neck</td>
<td>2&lt;sup&gt;1&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>Left axilla</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Right thigh area</td>
<td>1</td>
</tr>
<tr>
<td>Lesions</td>
<td>Neck region</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Thoracic region</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Leg region</td>
<td>4</td>
</tr>
<tr>
<td>Congested brain</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Fractures</td>
<td>.</td>
<td>.</td>
</tr>
</tbody>
</table>

<sup>1</sup>: located in the neck, thyroid gland and adjacent tissues of the neck

<sup>2</sup>: located on ventral neck at larynx level
Table 3
Predicted means ± standard errors of the mean of body measurements of calves born alive or dead: birth weight (BW), height to withers (height), girth, crown-rump length (CRL), body mass index (BMI) and ponderal index (PI).

<table>
<thead>
<tr>
<th></th>
<th>Stillbirth</th>
<th>Born alive (n=455)</th>
<th>Born dead (n=35)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>BW (kg)</td>
<td></td>
<td>39.3 ± 0.9</td>
<td>38.5 ± 1.0</td>
<td>n.s</td>
</tr>
<tr>
<td>Height (cm)</td>
<td></td>
<td>75.1 ± 0.7</td>
<td>76.7 ± 0.8</td>
<td>n.s</td>
</tr>
<tr>
<td>Girth (cm)</td>
<td></td>
<td>75.6 ± 0.8</td>
<td>74.0 ± 0.9</td>
<td>n.s</td>
</tr>
<tr>
<td>CRL (cm)</td>
<td></td>
<td>86.4 ± 1.1</td>
<td>90.6 ± 1.2</td>
<td>***</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td></td>
<td>54.3 ± 1.3</td>
<td>48.6 ± 1.4</td>
<td>***</td>
</tr>
<tr>
<td>PI (kg/m³)</td>
<td></td>
<td>64.2 ± 2.0</td>
<td>55.1 ± 2.3</td>
<td>***</td>
</tr>
</tbody>
</table>

***: P<0.001; †: P<0.01; n.s: P>0.05
Table 4

Predicted means ± standard errors of the mean of body measurements of calves born from various degrees of difficulty (N: no assistance; FN: farmer assistance, Normal presentation of the calf; FM: farmer assistance, malpresented calf; V: veterinary assistance): birth weight (BW), height to withers (height), girth, crown-rump length (CRL), body mass index (BMI) and ponderal index (PI). Within a row, means without a common superscript differ (P<0.05).

<table>
<thead>
<tr>
<th>Birth difficulty</th>
<th>N (n=375)</th>
<th>FN (n=92)</th>
<th>FM (n=18)</th>
<th>V (n=5)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>BW (kg)</td>
<td>38.6 ± 0.8&lt;sup&gt;a&lt;/sup&gt;</td>
<td>40.3 ± 0.8&lt;sup&gt;b&lt;/sup&gt;</td>
<td>37.0 ± 1.4&lt;sup&gt;a&lt;/sup&gt;</td>
<td>39.8 ± 2.3&lt;sup&gt;a,b&lt;/sup&gt;</td>
<td>**</td>
</tr>
<tr>
<td>Height (cm)</td>
<td>76.0 ± 0.6</td>
<td>76.5 ± 0.7</td>
<td>76.7 ± 1.1</td>
<td>74.4 ± 1.9</td>
<td>n.s</td>
</tr>
<tr>
<td>Girth (cm)</td>
<td>75.4 ± 0.7</td>
<td>76.2 ± 0.7</td>
<td>74.3 ± 1.2</td>
<td>73.1 ± 2.0</td>
<td>n.s</td>
</tr>
<tr>
<td>CRL (cm)</td>
<td>C 87.1 ± 0.9&lt;sup&gt;a&lt;/sup&gt;</td>
<td>91.0 ± 1.0&lt;sup&gt;b&lt;/sup&gt;</td>
<td>88.8 ± 1.6&lt;sup&gt;a,b&lt;/sup&gt;</td>
<td>87.1 ± 3.9&lt;sup&gt;a,b&lt;/sup&gt;</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>S 88.8 ± 1.0</td>
<td>88.9 ± 1.2</td>
<td>87.0 ± 3.2</td>
<td>89.1 ± 3.2</td>
<td></td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>52.7 ± 1.1</td>
<td>51.9 ± 1.2</td>
<td>49.4 ± 1.9</td>
<td>51.7 ± 3.1</td>
<td>n.s</td>
</tr>
<tr>
<td>PI (kg/m³)</td>
<td>C 63.5 ± 1.7&lt;sup&gt;a&lt;/sup&gt;</td>
<td>58.3 ± 2.0&lt;sup&gt;b&lt;/sup&gt;</td>
<td>56.0 ± 3.1&lt;sup&gt;b&lt;/sup&gt;</td>
<td>62.3 ± 7.3&lt;sup&gt;a,b&lt;/sup&gt;</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>S 58.4 ± 1.8</td>
<td>60.0 ± 2.3</td>
<td>62.3 ± 6.0</td>
<td>56.3 ± 6.2</td>
<td></td>
</tr>
</tbody>
</table>

*: P<0.05; **: P<0.01; n.s: P>0.05