LETTERS & NOTICES

EQUINE MEDICINE

Genetics of equine metabolic syndrome

EQUINE metabolic syndrome (EMS) is defined as a complex disorder characterised by a phenotype of insulin dysregulation, obesity and a predisposition toward laminitis, resulting from the combination of one or more inherited genetic alleles and environmental influences.1

Recently, a genome-wide association study (GWAS)2 identified two genetic markers for EMS located in the FAM174A gene region in Arabian horses: BIEC2-263524-C and FAM174A 3' UTR -11(G) (Equus caballus chromosome 14:69,276,814 and 14:69,119,991 in EquCab2.0, respectively), with a correlation of 98 per cent between the two. However, uniform fasting guidelines were not followed and the studied populations were older than the general age of onset of EMS.3 This led to inconsistent diagnoses of EMS, since variability in non-structural carbohydrates, content of forage and age of horses influence metabolism and phenotypic measures.1,4

In addition, some EMS cases used for the GWAS were affected by pituitary pars intermedia dysfunction, which also produces insulin dysregulation. This element could have been solved by validating GWAS results with a combination of one genetic marker and FAM174A 3' UTR -11(G) allele seems a poor indicator of EMS, as it is absent in most EMS-affected individuals. This is most likely due to a low effect of the FAM174A gene on the aetiology of this disease, the complexity of the resulting phenotype and the fact that several loci may be driving its genetic background. Future studies should take all intrinsic and extrinsic factors into account to establish a clear phenotype of EMS.

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References
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Table 1: Characteristics of animals with equine metabolic syndrome

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Breed</th>
<th>Sex</th>
<th>BCS</th>
<th>CNS</th>
<th>Glucose (mg/dl)</th>
<th>Insulin (µu/ml)</th>
<th>MIRG</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>8</td>
<td>F</td>
<td>7</td>
<td>3</td>
<td>104</td>
<td>51.3</td>
<td>12.8</td>
</tr>
<tr>
<td>2</td>
<td>10</td>
<td>M</td>
<td>7</td>
<td>4</td>
<td>79</td>
<td>27.1</td>
<td>13.1</td>
</tr>
<tr>
<td>1</td>
<td>12</td>
<td>M</td>
<td>8</td>
<td>4</td>
<td>83</td>
<td>25.7</td>
<td>11.8</td>
</tr>
<tr>
<td>4</td>
<td>9</td>
<td>F</td>
<td>7</td>
<td>3</td>
<td>74</td>
<td>24.1</td>
<td>13.6</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>M</td>
<td>8</td>
<td>5</td>
<td>94</td>
<td>&lt;200</td>
<td>OR*</td>
</tr>
</tbody>
</table>

* Out of range due to insulin level being too high

BCS Body-condition score, CNS Cresty neck score, F Female, M Male, MIRG Modified insulin-to-glucose ratio

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