The underestimation of painful conditions in reptiles may result in serious health deterioration or even in the death of patients in the perioperative and postoperative period. Commonly occurring painful conditions in lizards include pododermatitis, periodontal inflammation, arthritis, spondylitis, osteomyelitis, and articular gout (Redrobe, 2004). Recent references stress a need for the pain control in reptiles in addition to anaesthesia (Redrobe, 2004; Kirchgessner, 2006; Schumacher and Yelen, 2006). Many sources dealing with surgery, anaesthesia and analgesia in reptiles mention substances commonly used in mammalian species (Bennett, 1998; Carpenter et al., 2001; Girling and Raiti, 2004; Redrobe, 2004; Wellehan and Gunkel, 2004; Kirchgessner, 2006; Schumacher and Yelen, 2006) such as non-steroidal anti-inflammatory drugs (NSAIDs), i.e. carprofen (1.0–4.0 mg/kg) and meloxicam (0.1–0.3 mg/kg), for the control of chronic painful conditions including metabolic skeletal disorders, gout and neoplasia (Schumacher and Yelen, 2006). Some authors reported the risk of the use of NSAIDs in patients with liver and kidney diseases (Wellehan and Gunkel, 2004). Special attention should be paid to this risk because disorders of these organs occur frequently in captive reptiles (Boyer et al., 1996; Ball et al., 1999; Antinoff, 2000; Divers and Cooper, 2000). When selecting a suit-
able combination of analgesics and anaesthetics, it is therefore necessary to monitor the liver and kidney function using techniques including diagnostic imaging, haematology and plasma chemistry (Boyer et al., 1996; Knotek et al., 2002; Hernandez-Divers et al., 2005).

The objective of this study was to evaluate and compare the effects of repeated administration of non-steroidal anti-inflammatory drugs, meloxicam and carprofen, on the blood profile of green iguanas kept under captive experimental conditions.

MATERIAL AND METHODS

The study was performed using a group of green iguanas (Iguana iguana) kept under experimental conditions at the Avian and Exotic Animal Clinic, Faculty of Veterinary Medicine, University of Veterinary and Pharmaceutical Sciences in Brno. A total of 20 healthy green iguanas (14 males and six females with body weight ranging from 280 to 720 g) were included in the experiment. The lizards were manually restrained for intramuscular injections every morning of the 10-day experimental period. Group A iguanas received carprofen (2.0 mg/kg Rimadyl inj. a.u.v., Pfizer), group B iguanas were applied meloxicam (0.2 mg/kg Metacam inj. a.u.v., BASF) and group C lizards saline (0.02 ml sodium chloride 0.9% in water for injection, SIFRA, Italy). Injection sites were alternated daily using the muscles of the front legs. Blood collection on Day 1 and 11, and laboratory processing and examination of samples were performed in accordance with previously published methods (Knotkova et al., 2006). The mean values of studied parameters were computed using Excel (XP, Office, Microsoft). A paired t-test was employed to evaluate the effect of 10-day administration of drugs within individual groups. Differences between individual groups were assessed by analysis of variance using the Scheff method of contrasts (Matouskova et al., 1992). Statistical significance was determined as P < 0.05 or P < 0.01.

RESULTS

There were no changes of clinical importance in haematological parameters of green iguanas following the 10-day intramuscular administration of both carprofen and meloxicam. Comparing the values within individual groups, a decrease in the concentration of haemoglobin and PCV accompanied by an increase in the percentage of azurophils was observed in carprofen-treated green iguanas (P < 0.05). A decrease in haemoglobin and PCV (P < 0.05) was also observed in iguanas in the control group. Lizards in all three groups showed rising levels of ALT (P < 0.01). Decreased levels of Ca (P < 0.01) were found in meloxicam-treated iguanas as well as in controls. The mean levels of ALT in carprofen-treated green iguanas (2.42 ± 0.52 μkat/l) were considerably higher (P < 0.01) than both in meloxicam-treated iguanas (0.49 ± 0.18 μkat/l) and in controls (0.43 ± 0.13 μkat/l). Repeated doses of carprofen induced higher levels of AST (0.82 ± 0.26 μkat/l) than saline (P < 0.01, 0.31 ± 0.16 μkat/l) or meloxicam (P < 0.05, 0.38 ± 0.16 μkat/l). Blood parameters of both experimental groups of iguanas were within physiological reference values of healthy green iguanas (Pejrilova et al., 2004; Knotkova et al., 2005, 2006). The mean values of haematological and biochemical parameters of experimental green iguanas are shown in tables (Table 1 and 2).

DISCUSSION

Various combinations of anaesthetics have been recommended for surgical procedures in reptiles (Lumb and Jones, 1984; Mosley et al., 2003a,b, 2004; Mauthe von Degerfeld, 2004). However, the establishment of effective analgesic regimens in reptiles is still problematic (Heard, 2001; Machin, 2001; Read, 2004; Redrobe, 2004; Schumacher and Yelen, 2006). A suitable analgesic regime should be selected in conjunction with an assessment of the unique metabolic and pharmacokinetic processes that occur in reptiles (Tuttle et al., 2006). It is also imperative to consider the possible adverse effects of NSAIDs on the gastric mucosa, kidney function and blood coagulation (Tuttle et al., 2006). The evaluation of peripheral blood parameters is essential for monitoring the health and more specifically the organ function in reptiles. Accordingly, haematological and biochemical profiles prior to and after the 10-day intramuscular administration of two non-steroidal anti-inflammatory drugs were evaluated. Neither carprofen nor meloxicam induced any clinically serious changes in haematological parameters in the green iguana. A rise in the ALT level was found in experimental animals;
however, there was also an increase in this parameter in the control group. The mean levels of ALT in carprofen-treated green iguanas were significantly higher than those in iguanas treated with meloxicam and saline. Repeated doses of carprofen also induced higher levels of AST than the administration of both meloxicam and saline. The cause of these differences is not known. Carprofen induced

### Table 1. The biochemical plasma profile of green iguanas prior to and after the 10-day intramuscular administration of non-steroidal analgesics

<table>
<thead>
<tr>
<th>Group</th>
<th>Day</th>
<th>TP (g/l)</th>
<th>Glucose (mmol/l)</th>
<th>UA (μmol/l)</th>
<th>ALP (μkat/l)</th>
<th>ALP (μkat/l)</th>
<th>AST (μkat/l)</th>
<th>Ca (mmol/l)</th>
<th>P (mmol/l)</th>
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<tr>
<td>Meloxicam (n = 7)</td>
<td></td>
<td>43.99</td>
<td>10.13</td>
<td>108.34</td>
<td>0.79</td>
<td>0.20*</td>
<td>1.71</td>
<td>3.22*</td>
<td>2.04</td>
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<tr>
<td>Carprofen (n = 5)</td>
<td></td>
<td>47.29</td>
<td>9.52</td>
<td>103.23</td>
<td>0.76</td>
<td>0.49**</td>
<td>0.38</td>
<td>2.80*</td>
<td>1.55</td>
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<tr>
<td>Control (n = 8)</td>
<td></td>
<td>10.97</td>
<td>1.44</td>
<td>42.21</td>
<td>0.30</td>
<td>0.18</td>
<td>0.16</td>
<td>0.09</td>
<td>0.16</td>
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Comparisons between groups: * (P < 0.01), ** (P < 0.05), *** (P < 0.001)

Comparisons within groups: * (P < 0.01)

### Table 2. The haematological blood profile of green iguanas prior to and after the 10-day intramuscular administration of non-steroidal analgesics

<table>
<thead>
<tr>
<th>Group</th>
<th>Day</th>
<th>Hb (g/l)</th>
<th>PCV (l/l)</th>
<th>ERY (T/l)</th>
<th>LEU (G/l)</th>
<th>HE (G/l)</th>
<th>EO (G/l)</th>
<th>BA (G/l)</th>
<th>MO (G/l)</th>
<th>AZ (G/l)</th>
<th>LY (G/l)</th>
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<tr>
<td>Meloxicam (n = 7)</td>
<td></td>
<td>81.37</td>
<td>0.31</td>
<td>1.14</td>
<td>8.5</td>
<td>2.53</td>
<td>0.01</td>
<td>0.23</td>
<td>0.27</td>
<td>0.59</td>
<td>4.87</td>
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<tr>
<td>Carprofen (n = 5)</td>
<td></td>
<td>92.25*</td>
<td>0.32*</td>
<td>1.13</td>
<td>7.38</td>
<td>2.67</td>
<td>0.05</td>
<td>0.36</td>
<td>0.22</td>
<td>0.54*</td>
<td>3.55</td>
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<tr>
<td>Control (n = 8)</td>
<td></td>
<td>81.66*</td>
<td>0.30*</td>
<td>1.14</td>
<td>9.75</td>
<td>3.64</td>
<td>0.07</td>
<td>0.33</td>
<td>0.22</td>
<td>0.93</td>
<td>4.57</td>
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</table>

Comparisons within groups: * (P < 0.05)
a decrease in the haemoglobin level and PCV in green iguanas. The same changes, however, were found in control animals. Decreased levels of Ca were found in meloxicam-treated and control green iguanas. Nevertheless, these levels were within the physiological reference range of healthy green iguanas (Pejrilova et al., 2004; Knotkova et al., 2005, 2006). None of the changes in blood parameters found in green iguanas had any adverse effects on their health state.

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