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## Data Article

# Dataset concerning haematological and biochemical parameters changes in show jumping horses subjected to exercise and plasmapheresis session

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## ABSTRACT

This article presents data on the effect of plasmapheresis on clinical, haematological and biochemical parameters in horses following exercise and after a plasmapheresis session. This blood filtration technique was realised on six jumping horses (plasmapheresis group) that underwent three consecutive days of graded physical exercise. The control group (n = 6) went through the same exercise but was not subjected to the plasmapheresis session. Blood was sampled before and after each exercise, also at the beginning and the end of plasmapheresis session. The presented data was obtained by measuring clinical and haemato-biochemical parameters in both groups. The heart and respiratory rates and rectal temperature were recorded. In addition, the number of red blood and white cells, platelets also of lymphocytes, monocytes, eosinophils and granulocytes were counted. Other haematological

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parameters including, hemoglobin concentration, hematocrit, mean corpuscular volume, mean corpuscular hemoglobin, mean corpuscular hemoglobin concentration were determined. Concerning the biochemical parameters, the concentrations of albumin, globulin, total protein, glucose, alkaline phosphatase, aspartate aminotransferase, gamma glutamyl transferase, total bilirubin, lactate, creatinine kinase, urea, creatinine, calcium, sodium and potassium were measured. All parameters data were analyzed by a two-way repeated measures analysis of variance followed by Holm-Sidak post-hoc procedure to evaluate the effect of plasmapheresis and time. This paper contains data related to and supporting research articles currently published entitled "Plasmapheresis effect on haematological and biochemical parameters in athletic horses subjected to exercise" (Daden et al., 2019) [1].

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#### Specifications Table

|                                |  |
|--------------------------------|--|
| Subject                        | Veterinary Science and Veterinary Medicine   |
| Specific subject area          | Equine medicine, Equine exercise, Exercise physiology, Blood filtration technique, Plasmapheresis, Haematology Biochemistry  |
| Type of data                   | Tables, Figure   |
| How data were acquired         | <p><u>-Physiological parameters:</u><br/>Physiological parameters were measured in the two groups using the same procedures as in clinical examination.</p> <ul style="list-style-type: none"> <li>• Heart rate: the pulse on the facial artery was taken.</li> <li>• Respiratory rate: Horse's chest movements were counted.</li> <li>• Rectal temperature: recorded using a digital thermometer (range, 32–42 °C; accuracy, 0.1 °C).</li> </ul> <p><u>-Plasmapheresis:</u> was performed by using a Hemofenix® plasmapheresis machine commercialized by Hemofenix-France utilizing Trackpore® technology (Dubna Moscow region-Russian Federation).<br/> <u>-Blood sampling:</u> Blood samples were obtained by jugular venipuncture and were collected in BD-Vacutainer EDTA tubes for haematological parameters and in lithium heparin'BD-Vacutainer tubes for biochemical parameters.<br/> <u>-Haematological parameters analysis</u> was performed by using a veterinary cell-counter automate, the Celltac VET MEK-6550® haematology (Nihon Kohden, Tomioka-Japan) and its reagents, Hemolynac-3 MEK-660I, Isotonac-4 MEK-641I, Cleanac MEK-520I (Celltac VET MEK-6550 J/K haematology, Nihon Kohden, Tomioka-Japan).<br/> <u>-Biochemical parameters</u> were assayed using the veterinary Skyla-VB1® automate analyzer (Lite-On Technology Corporation, Hsinchu-Taiwan) and reagent disc (Equine Panel- Product code 900-150, skylaTM VB1® reagent disc, Hsinchu-Taiwan).<br/> <u>-Lactate concentrations</u> were determined using Lactate-Pro™ 2 analyzer (Busimedica®, S.L. San Sebastián-Spain).</p> |
| Data format                    | Raw Data   |
| Parameters for data collection | The data were obtained from 12 show jumping horses that were divided into plasmapheresis (n = 6) and control (n = 6) groups. Each group contained 3 females and 3 males of Anglo-Hispano-Arab breed, aged from 4 to 12 years and weighing 400 kg. Throughout the study, horses were healthy and their clinical state was rigorously controlled.  |
| Description of data collection | All horses underwent the same daily physical exercise for three consecutive days. Following the 3rd day exercise, a plasmapheresis session was performed only on horses of plasmapheresis group. All physiological and haemato-biochemical parameters data presented in this article were obtained from blood samples taken simultaneously on horses of the plasmapheresis and control groups before and after each exercise and after plasmapheresis session for the following 4 days.  |

|                          |  |
|--------------------------|--|
| Data source location     | Royal Guard of Tétouan<br>Tétouan<br>Morocco<br>Latitude: 35.5730287<br>Longitude: 5.3515084<br>GPS Coordinates: 35° 34' 22.904" N 5° 21' 5.429" W   |
| Data accessibility       | Raw Data is available with this article  |
| Related research article | Réda Daden <sup>a,b</sup> , Fatima Zahraa Zarhouini <sup>a</sup> , Jamal Chakir <sup>c</sup> , Mohammed Piro <sup>d</sup> , Mohamed Rachid Achaaban <sup>a</sup> , Mohammed Ouassat <sup>a</sup> & Khalid El Allali <sup>a</sup> .<br>"Plasmapheresis Effect on Haematological and Biochemical Parameters in Athletic Horses Subjected To Exercise"<br>Journal of Equine Veterinary Science<br><a href="https://doi.org/10.1016/j.jevs.2019.07.006">https://doi.org/10.1016/j.jevs.2019.07.006</a> |

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### Value of the Data

- This data represents for the first time the changes in physiological, haematological and biochemical parameters in horses subjected to a plasmapheresis session after three days of exercise. It can be thus taken into consideration by other researchers interested in both sport physiology and blood filtration techniques field.
  - Such data can be used as a reference series for comparative approaches in the field. By providing relevant information, it allows a reuse and a better interpretation of the results. This is also useful for future studies.
  - In addition, the present data show informations that are complementing the related article and can be interesting for readers of the Data in Brief journal.
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## 1. Data

Data shown in this article provide information about the effect of plasmapheresis on physiological, haematological and biochemical parameters in athletic horses subjected to exercise. Horses of both plasmapheresis and control groups underwent each morning an exercise of 30 min/day, during 3 successive days (Day -2, -1 and 0). Following the exercise session of the 3rd day (Day 0) a plasmapheresis session was performed only on the horses of the plasmapheresis group. The control group were maintained in the same environment but without being subjected to plasmapheresis. Data of haemato-biochemical parameters were obtained by analyzing blood samples collected before and after exercise and plasmapheresis. Tables 1–3 describe clinical parameters variations subsequent to an exercise and a plasmapheresis session. Tables 4–10 represent each one parameters of red hemogram before and after exercise also before and after a plasmapheresis session. Tables 11–15 describe parameters of white hemogram and their changes subsequent to exercise and plasmapheresis session. Tables 16–30, represent variations of biochemical parameters before and after graded exercise and plasmapheresis session.

Fig. 1 illustrate Lactate concentrations before and following the exercise test standardized by Demonceau and Auvinet [2], also before and following the modification of the warm-up phase of the same exercise test.

### 1.1. Tables

The following tables containing raw data concerning changes in physiological, haematological and biochemical parameters of horses subjected to graded physical exercise and plasmapheresis session. Data of each sample are presented individually for animals of the control and plasmapheresis groups. S1, S3, S5: measurements before the exercise; S2, S4, S6: measurements after the exercise; S7: immediate measurement after the plasmapheresis session; S8, S9, S10, S11: post-plasmapheresis measurements at rest. D-2: 48h before plasmapheresis D-1: 24h before plasmapheresis; Day 0: day of plasmapheresis subsequent to the last exercise; D1, D2, D3 and D4 correspond to 24h, 48h, 72h and 96h respectively after plasmapheresis.

**Table 1**Rectal temperature ( $^{\circ}\text{C}$ )<sup>a</sup> in jumping horses subsequent to an exercise and a plasmapheresis session.

| Group                | Horse      | Time (Days/Samples) |      |      |      |      |      |      |      |      |      |      |
|----------------------|------------|---------------------|------|------|------|------|------|------|------|------|------|------|
|                      |            | D-2                 |      | D-1  |      | D0   |      |      | D1   | D2   | D3   | D4   |
|                      |            | S1                  | S2   | S3   | S4   | S5   | S6   | S7   | S8   | S9   | S10  | S11  |
| Control Group        | Acolito    | 37.5                | 40.1 | 37.5 | 40.2 | 37.5 | 40.3 | 38.1 | 37.5 | 37.8 | 37.6 | 37.5 |
|                      | Dahbi      | 37.2                | 40   | 37.8 | 40.8 | 37.5 | 40.9 | 37.5 | 38.3 | 38.6 | 38.5 | 38.6 |
|                      | Chamaa     | 37.8                | 40.6 | 37.6 | 40.6 | 37.5 | 40.5 | 38.1 | 37.9 | 37.6 | 37.5 | 37.6 |
|                      | Dahman     | 37.6                | 39.9 | 37.6 | 39.9 | 37.6 | 40.1 | 38.2 | 37.5 | 37.5 | 37.5 | 37.5 |
|                      | Damaa      | 37.5                | 39.9 | 37.6 | 40   | 37.6 | 40.1 | 38.3 | 37.6 | 37.5 | 37.5 | 37.6 |
|                      | Dalilano   | 37.8                | 41   | 37.6 | 39.9 | 37.6 | 40.1 | 38.2 | 37.5 | 37.5 | 37.5 | 37.5 |
| Plasmapheresis Group | Beluc      | 37.6                | 39.9 | 37.6 | 39.9 | 37.6 | 40.1 | 38.2 | 37.5 | 37.5 | 37.5 | 37.5 |
|                      | Chaddy     | 37.5                | 40.8 | 37.5 | 40.9 | 37.5 | 40.9 | 37.5 | 38.3 | 38.6 | 38.5 | 38.6 |
|                      | Printanier | 37.7                | 40.9 | 37.8 | 40.8 | 37.7 | 40.9 | 37.9 | 37.8 | 37.8 | 37.9 | 37.8 |
|                      | Daoudiya   | 37.7                | 40.6 | 37.8 | 41   | 37.8 | 40.9 | 40.1 | 37.9 | 37.8 | 37.8 | 37.8 |
|                      | Camelia    | 37.6                | 40.6 | 37.6 | 40.6 | 37.5 | 40.5 | 38.1 | 37.9 | 37.6 | 37.5 | 37.6 |
|                      | Doualiya   | 37.8                | 39.9 | 37.9 | 40.2 | 37.5 | 40.1 | 39.1 | 38.2 | 37.5 | 38.5 | 39.5 |

<sup>a</sup> Normal rectal temperature of adult horse: 37.0–38.0  $^{\circ}\text{C}$  [3].**Table 2**Heart rate (beats per minute)<sup>a</sup> changes in jumping horses subsequent to an exercise and a plasmapheresis session.

| Group                | Horse      | Time (Days/Samples) |     |     |     |    |     |    |    |    |     |     |
|----------------------|------------|---------------------|-----|-----|-----|----|-----|----|----|----|-----|-----|
|                      |            | D-2                 |     | D-1 |     | D0 |     |    | D1 | D2 | D3  | D4  |
|                      |            | S1                  | S2  | S3  | S4  | S5 | S6  | S7 | S8 | S9 | S10 | S11 |
| Control Group        | Acolito    | 36                  | 112 | 36  | 116 | 36 | 120 | 38 | 36 | 36 | 38  | 36  |
|                      | Dahbi      | 36                  | 120 | 36  | 126 | 36 | 123 | 36 | 36 | 36 | 36  | 36  |
|                      | Chamaa     | 32                  | 120 | 36  | 132 | 36 | 123 | 38 | 36 | 36 | 38  | 36  |
|                      | Dahman     | 36                  | 110 | 36  | 115 | 36 | 110 | 36 | 36 | 38 | 36  | 36  |
|                      | Damaa      | 36                  | 120 | 36  | 132 | 36 | 152 | 36 | 36 | 38 | 36  | 38  |
|                      | Dalilano   | 36                  | 115 | 36  | 110 | 36 | 110 | 36 | 36 | 38 | 36  | 36  |
| Plasmapheresis Group | Beluc      | 36                  | 110 | 36  | 113 | 36 | 100 | 36 | 36 | 38 | 36  | 36  |
|                      | Chaddy     | 36                  | 104 | 36  | 100 | 36 | 120 | 36 | 36 | 36 | 36  | 36  |
|                      | Printanier | 45                  | 167 | 44  | 162 | 44 | 152 | 46 | 44 | 45 | 46  | 44  |
|                      | Daoudiya   | 41                  | 110 | 44  | 120 | 44 | 118 | 45 | 44 | 42 | 44  | 40  |
|                      | Camelia    | 32                  | 110 | 36  | 120 | 36 | 114 | 38 | 36 | 36 | 38  | 36  |
|                      | Doualiya   | 38                  | 112 | 40  | 132 | 42 | 110 | 40 | 36 | 38 | 38  | 36  |

<sup>a</sup> Normal heart rate of adult horse: 30–40 beats per minute [3].**Table 3**Respiratory rate (breaths per minute)<sup>a</sup> changes in jumping horses subsequent to an exercise and a plasmapheresis session.

| Group                | Horse      | Time (Days/Samples) |    |     |    |    |    |    |    |    |     |     |
|----------------------|------------|---------------------|----|-----|----|----|----|----|----|----|-----|-----|
|                      |            | D-2                 |    | D-1 |    | D0 |    |    | D1 | D2 | D3  | D4  |
|                      |            | S1                  | S2 | S3  | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 |
| Control Group        | Acolito    | 24                  | 68 | 26  | 68 | 26 | 68 | 28 | 24 | 24 | 24  | 24  |
|                      | Dahbi      | 20                  | 68 | 24  | 64 | 20 | 72 | 24 | 28 | 24 | 28  | 24  |
|                      | Chamaa     | 20                  | 68 | 24  | 62 | 20 | 66 | 24 | 24 | 20 | 24  | 24  |
|                      | Dahman     | 20                  | 64 | 28  | 68 | 24 | 66 | 28 | 24 | 22 | 24  | 24  |
|                      | Damaa      | 20                  | 64 | 28  | 68 | 24 | 66 | 28 | 24 | 22 | 24  | 24  |
|                      | Dalilano   | 20                  | 66 | 28  | 68 | 24 | 68 | 28 | 24 | 22 | 24  | 24  |
| Plasmapheresis Group | Beluc      | 20                  | 64 | 28  | 68 | 24 | 66 | 28 | 24 | 22 | 24  | 24  |
|                      | Chaddy     | 24                  | 64 | 20  | 72 | 24 | 68 | 24 | 28 | 24 | 28  | 24  |
|                      | Printanier | 28                  | 98 | 32  | 68 | 28 | 72 | 24 | 28 | 28 | 28  | 28  |
|                      | Daoudiya   | 28                  | 64 | 28  | 63 | 26 | 68 | 28 | 26 | 24 | 24  | 24  |
|                      | Camelia    | 24                  | 68 | 24  | 63 | 20 | 68 | 24 | 24 | 20 | 24  | 24  |
|                      | Doualiya   | 24                  | 68 | 28  | 68 | 24 | 66 | 28 | 24 | 28 | 26  | 24  |

<sup>a</sup> Normal respiratory rate of adult horse: 8–20 breaths per minute [4].

**Table 4**Red blood cell count ( $10^6/\mu\text{L}$ )<sup>a</sup> changes in jumping horses subsequent to exercise and a plasmapheresis session.

| Group                | Horse      | Time (Days/Samples) |      |      |      |      |      |      |      |      |      |      |
|----------------------|------------|---------------------|------|------|------|------|------|------|------|------|------|------|
|                      |            | D-2                 |      | D-1  |      | D0   |      |      | D1   | D2   | D3   | D4   |
|                      |            | S1                  | S2   | S3   | S4   | S5   | S6   | S7   | S8   | S9   | S10  | S11  |
| Control Group        | Acolito    | 8.88                | 10.6 | 8.58 | 10.4 | 10.2 | 13.2 | 8.01 | 7.47 | 7.92 | 8.62 | 8.71 |
|                      | Dahbi      | 8.63                | 13.3 | 8.58 | 10.4 | 8.61 | 10.7 | 8.67 | 10.3 | 9.6  | 8.17 | 8.63 |
|                      | Chamaa     | 8.71                | 12.2 | 9.42 | 11.9 | 11.2 | 14.3 | 10   | 8.49 | 9.11 | 8.56 | 9.01 |
|                      | Dahman     | 7.59                | 12.1 | 9.74 | 11.6 | 9.34 | 11.2 | 10.2 | 7.58 | 7.75 | 7.53 | 7.56 |
|                      | Damaa      | 7.59                | 12.1 | 9.74 | 11.6 | 8.02 | 11.9 | 7.99 | 7.58 | 7.75 | 7.53 | 7.56 |
|                      | Dalilano   | 7.53                | 12.1 | 9.74 | 11.6 | 8.1  | 12.4 | 9.52 | 7.75 | 7.53 | 7.74 | 13.4 |
| Plasmapheresis Group | Beluc      | 11.7                | 11.3 | 9.74 | 12.9 | 10.2 | 13.1 | 13.2 | 12.3 | 10.6 | 10.4 | 9.31 |
|                      | Chaddy     | 11.2                | 15.3 | 9.94 | 14.5 | 11.2 | 14.7 | 13.5 | 12.1 | 10.3 | 9.27 | 10.3 |
|                      | Printanier | 8.26                | 11.4 | 8.3  | 11.5 | 8.35 | 11.3 | 11.9 | 10.3 | 10.2 | 7.96 | 7.43 |
|                      | Daoudiya   | 7.56                | 12.1 | 9.42 | 11.9 | 9.79 | 12.6 | 12.8 | 10.2 | 7.96 | 7.82 | 10.2 |
|                      | Camelia    | 8.71                | 12.2 | 9.42 | 12.3 | 10.4 | 12.4 | 12.7 | 8.03 | 6.95 | 7.22 | 10.5 |
|                      | Doualiya   | 7.92                | 11.4 | 7.39 | 11.5 | 8.35 | 11.3 | 13   | 7.25 | 8    | 8.19 | 8.39 |

<sup>a</sup> Reference range: 6.70–12.90.10<sup>6</sup>/μL [5].**Table 5**Changes in blood hemoglobin concentrations (g/dl)<sup>a</sup> in jumping horses subsequent to exercise and a plasmapheresis session.

| Group                | Horse      | Time (Days/Samples) |      |      |      |      |      |      |      |      |      |      |
|----------------------|------------|---------------------|------|------|------|------|------|------|------|------|------|------|
|                      |            | D-2                 |      | D-1  |      | D0   |      |      | D1   | D2   | D3   | D4   |
|                      |            | S1                  | S2   | S3   | S4   | S5   | S6   | S7   | S8   | S9   | S10  | S11  |
| Control Group        | Acolito    | 14.2                | 16.9 | 13.7 | 17.5 | 11.7 | 17.4 | 13   | 12.3 | 13.2 | 14.1 | 14.3 |
|                      | Dahbi      | 13.3                | 19.3 | 13.2 | 16.7 | 13.2 | 16.8 | 13.5 | 15.8 | 14.6 | 12.7 | 13.4 |
|                      | Chamaa     | 13                  | 17.3 | 14.1 | 17.4 | 14.5 | 17.8 | 12.9 | 12.9 | 13.4 | 13.2 | 13   |
|                      | Dahman     | 11                  | 18.2 | 15.5 | 17.6 | 15.8 | 16.2 | 12.1 | 11.3 | 10.9 | 11   | 10.8 |
|                      | Damaa      | 11                  | 15.6 | 11.5 | 14.3 | 11.6 | 14.1 | 11.3 | 12.7 | 11.3 | 11.9 | 12.7 |
|                      | Dalilano   | 11.1                | 18.2 | 15.5 | 17.6 | 15.8 | 18.1 | 11.8 | 10.9 | 11   | 11   | 18.9 |
| Plasmapheresis Group | Beluc      | 17                  | 17.7 | 15.5 | 19.4 | 15.3 | 19.8 | 19.6 | 14.6 | 14.8 | 15.6 | 13.8 |
|                      | Chaddy     | 15.2                | 24.4 | 13.4 | 19.2 | 14.3 | 19.7 | 19.2 | 13.9 | 13.5 | 12.5 | 14.5 |
|                      | Printanier | 12.2                | 17.3 | 12.1 | 17   | 12   | 16.8 | 17   | 12   | 12.2 | 11.8 | 11.1 |
|                      | Daoudiya   | 10.5                | 18   | 14.1 | 17.4 | 14.5 | 17.1 | 19.2 | 12.8 | 12   | 10.7 | 13.6 |
|                      | Camelia    | 13                  | 17.3 | 14.1 | 17.4 | 16.8 | 17.5 | 17.5 | 12.2 | 12.3 | 10.8 | 15.8 |
|                      | Doualiya   | 10.8                | 17.3 | 10.3 | 17   | 12   | 16.8 | 17   | 12.3 | 11.9 | 12.6 | 12.2 |

<sup>a</sup> Reference range: 11.0–19.0 g/dl [6].**Table 6**Blood hematocrit (g/dL)<sup>a</sup> changes in jumping horses subsequent to exercise and a plasmapheresis session.

| Group                | Horse      | Time (Days/Samples) |      |      |      |      |      |      |      |      |      |      |
|----------------------|------------|---------------------|------|------|------|------|------|------|------|------|------|------|
|                      |            | D-2                 |      | D-1  |      | D0   |      |      | D1   | D2   | D3   | D4   |
|                      |            | S1                  | S2   | S3   | S4   | S5   | S6   | S7   | S8   | S9   | S10  | S11  |
| Control Group        | Acolito    | 43.9                | 52.5 | 42.5 | 51.7 | 36.5 | 52.9 | 39.5 | 39.9 | 38   | 35.2 | 34   |
|                      | Dahbi      | 40.4                | 59.8 | 40.4 | 54   | 40.3 | 50.8 | 41.1 | 44.9 | 39   | 37.7 | 39.5 |
|                      | Chamaa     | 39.5                | 52.4 | 42.5 | 52.4 | 44.4 | 53.3 | 38.9 | 38.5 | 36   | 34.2 | 38.8 |
|                      | Dahman     | 34                  | 54.9 | 43.8 | 50   | 43   | 49   | 36.2 | 38.5 | 37.4 | 34.9 | 35.6 |
|                      | Damaa      | 36.6                | 48.5 | 36.8 | 53   | 35.9 | 56.1 | 48.9 | 43.1 | 49   | 51.3 | 34.4 |
|                      | Dalilano   | 33                  | 54.9 | 42.9 | 52   | 43   | 54.8 | 36   | 37.7 | 36   | 37   | 34.2 |
| Plasmapheresis Group | Beluc      | 37.5                | 53.3 | 43.8 | 57.9 | 45.7 | 59.2 | 59   | 31.9 | 35.4 | 33.7 | 35.6 |
|                      | Chaddy     | 37.9                | 53   | 41.3 | 53   | 43   | 61.4 | 60.9 | 32.8 | 33.3 | 32.6 | 32.8 |
|                      | Printanier | 36.1                | 51.3 | 36.8 | 53   | 37   | 51.2 | 53   | 32.7 | 31.1 | 28.2 | 30.6 |
|                      | Daoudiya   | 38.5                | 55.2 | 42.5 | 52.4 | 44.4 | 53.9 | 54   | 31.2 | 40.1 | 37.3 | 31.3 |
|                      | Camelia    | 42.1                | 52.4 | 42.5 | 52.4 | 45   | 53   | 50.6 | 37.7 | 36.8 | 38.1 | 35.4 |
|                      | Doualiya   | 37                  | 51.3 | 32.8 | 51.4 | 33.8 | 51.2 | 53   | 34.7 | 36.7 | 33   | 33.8 |

<sup>a</sup> Reference range: 32.0–53.0 g/dl [6].

**Table 7**Changes in blood mean corpuscular volume (fL)<sup>a</sup> in jumping horses subsequent to exercise and a plasmapheresis session.

| Group                | Horse      | Time (Days/Samples) |      |      |      |      |      |      |      |      |      |      |
|----------------------|------------|---------------------|------|------|------|------|------|------|------|------|------|------|
|                      |            | D-2                 |      | D-1  |      | D0   |      |      | D1   | D2   | D3   | D4   |
|                      |            | S1                  | S2   | S3   | S4   | S5   | S6   | S7   | S8   | S9   | S10  | S11  |
| Control Group        | Acolito    | 44.8                | 46   | 45   | 46   | 44.6 | 45.2 | 44.8 | 44.6 | 44.4 | 44.5 | 44.6 |
|                      | Dahbi      | 41.4                | 44   | 41.5 | 44.1 | 41.3 | 43   | 41.7 | 41.3 | 41.6 | 41.2 | 40.9 |
|                      | Chamaa     | 44.3                | 45.2 | 44.2 | 45   | 44.3 | 45.2 | 44.9 | 44.4 | 44.1 | 44.3 | 44.5 |
|                      | Dahman     | 42.1                | 45.6 | 45.4 | 45.5 | 45.4 | 43   | 42.7 | 42.3 | 42.2 | 42.2 | 42.2 |
|                      | Damaa      | 45                  | 46.8 | 44.6 | 45.5 | 44.7 | 45.2 | 45.6 | 45.3 | 45   | 45.3 | 45.5 |
|                      | Dalilano   | 43.4                | 45.2 | 43   | 45.3 | 44.3 | 45.2 | 43.9 | 43   | 43.6 | 45.5 | 43.9 |
| Plasmapheresis Group | Beluc      | 45.4                | 46   | 45.5 | 46.1 | 44   | 45.5 | 45.5 | 44   | 44.9 | 45   | 45   |
|                      | Chaddy     | 46.8                | 47   | 46.3 | 47.4 | 45   | 46   | 47.1 | 45   | 44   | 47.2 | 47   |
|                      | Printanier | 41.4                | 43   | 41.3 | 45.5 | 45.4 | 45.9 | 45.2 | 45.1 | 44.9 | 45.2 | 44.9 |
|                      | Daoudiya   | 44.8                | 45.4 | 45   | 45.6 | 45.2 | 45.5 | 45.3 | 45.1 | 45   | 45   | 44.7 |
|                      | Camelia    | 41.2                | 42.8 | 40.9 | 42.3 | 41.2 | 42.1 | 42.4 | 41.6 | 41.3 | 41.8 | 41.7 |
|                      | Doualiya   | 44.8                | 45.4 | 45   | 45.6 | 43   | 43.1 | 43.2 | 44.9 | 45   | 43   | 42.9 |

<sup>a</sup> Reference range: 37.0–59.0 fL [6].**Table 8**Changes in blood mean corpuscular hemoglobin (pg)<sup>a</sup> in jumping horses subsequent to exercise and a plasmapheresis session.

| Group                | Horse      | Time (Days/Samples) |      |      |      |      |      |      |      |      |      |      |
|----------------------|------------|---------------------|------|------|------|------|------|------|------|------|------|------|
|                      |            | D-2                 |      | D-1  |      | D0   |      |      | D1   | D2   | D3   | D4   |
|                      |            | S1                  | S2   | S3   | S4   | S5   | S6   | S7   | S8   | S9   | S10  | S11  |
| Control Group        | Acolito    | 14.9                | 15.7 | 14.9 | 15.1 | 14.9 | 15.1 | 14.8 | 14.5 | 14.8 | 14.8 | 14.8 |
|                      | Dahbi      | 13.5                | 15.4 | 13.8 | 15.5 | 13.1 | 15.2 | 14.5 | 13.8 | 13.6 | 13.5 | 13.2 |
|                      | Chamaa     | 14.8                | 15.2 | 14.7 | 15   | 14.4 | 14.8 | 14.4 | 14.9 | 15   | 15.1 | 14.9 |
|                      | Dahman     | 14.5                | 14.9 | 14.7 | 15.1 | 14.8 | 15.3 | 14.2 | 14   | 13.9 | 13.7 | 13.4 |
|                      | Damaa      | 14.9                | 15   | 14.7 | 15.1 | 14.7 | 15.4 | 15.3 | 15.2 | 15.1 | 15   | 15.1 |
|                      | Dalilano   | 14                  | 15.2 | 13.8 | 15   | 14.4 | 15.2 | 14.7 | 14.6 | 14.1 | 14.6 | 15.1 |
| Plasmapheresis Group | Beluc      | 15                  | 16   | 15.2 | 16.2 | 15   | 16.3 | 16.2 | 15   | 14.9 | 15.2 | 15   |
|                      | Chaddy     | 15.6                | 16.2 | 15.4 | 16.1 | 15.5 | 15.7 | 15.8 | 15.4 | 15.6 | 15.5 | 15.5 |
|                      | Printanier | 14                  | 14.1 | 14   | 14.6 | 14   | 15.3 | 15.4 | 14.3 | 14.3 | 14.9 | 14.5 |
|                      | Daoudiya   | 14.5                | 15   | 14.6 | 14.9 | 14.4 | 14.7 | 14.9 | 14.6 | 14.5 | 14.6 | 14.8 |
|                      | Camelia    | 13.9                | 14.1 | 13.5 | 14.2 | 13.9 | 13.8 | 13.5 | 13.9 | 13.6 | 13.6 | 13.8 |
|                      | Doualiya   | 14.5                | 15   | 14.3 | 15   | 14.5 | 14.6 | 14.8 | 14.5 | 14.6 | 14.2 | 14.1 |

<sup>a</sup> Reference range: 12.3–19.9 pg [7].**Table 9**Changes in blood mean corpuscular hemoglobin concentration (g/dL)<sup>a</sup> in jumping horses subsequent to exercise and a plasmapheresis session.

| Group                | Horse      | Time (Days/Samples) |      |      |      |      |      |      |      |      |      |      |
|----------------------|------------|---------------------|------|------|------|------|------|------|------|------|------|------|
|                      |            | D-2                 |      | D-1  |      | D0   |      |      | D1   | D2   | D3   | D4   |
|                      |            | S1                  | S2   | S3   | S4   | S5   | S6   | S7   | S8   | S9   | S10  | S11  |
| Control Group        | Acolito    | 32.3                | 33   | 32.2 | 33.8 | 32.1 | 32.9 | 32.9 | 33.4 | 33.1 | 32.8 | 32.5 |
|                      | Dahbi      | 32.9                | 33.3 | 32.7 | 33.9 | 32.8 | 33.1 | 32.8 | 32.8 | 33.2 | 33.1 | 33   |
|                      | Chamaa     | 32.9                | 33   | 32.8 | 33.1 | 32.7 | 33.4 | 33.1 | 32.5 | 32.8 | 32.8 | 32.9 |
|                      | Dahman     | 32.4                | 33.2 | 32.3 | 33.1 | 32.4 | 33.1 | 33.4 | 32.7 | 32.5 | 32.6 | 32.6 |
|                      | Damaa      | 32.9                | 33   | 32.8 | 33.1 | 32.7 | 33.4 | 33.2 | 32.5 | 32.1 | 32   | 33   |
|                      | Dalilano   | 32.4                | 33.2 | 32.3 | 33.1 | 32.4 | 33   | 33   | 32.9 | 33   | 33   | 32.6 |
| Plasmapheresis Group | Beluc      | 32.4                | 33.2 | 32.5 | 33.5 | 32.5 | 33.4 | 33.1 | 32.4 | 32.3 | 32   | 32.5 |
|                      | Chaddy     | 32.7                | 33.2 | 33.2 | 33.2 | 32.6 | 33.1 | 33.6 | 33.6 | 33   | 32.7 | 32.1 |
|                      | Printanier | 33.3                | 33.7 | 32.8 | 33.5 | 32.4 | 33.2 | 32.2 | 32.1 | 32   | 32.5 | 33.1 |
|                      | Daoudiya   | 33                  | 32.6 | 32.8 | 33.1 | 32.7 | 33.1 | 31.6 | 32.1 | 32   | 32.4 | 32.6 |
|                      | Camelia    | 32.9                | 33   | 32.8 | 33.1 | 32.2 | 33.2 | 32.4 | 32.6 | 32.5 | 32.6 | 32.5 |
|                      | Doualiya   | 32.3                | 33.7 | 32.1 | 33.5 | 32.4 | 33.6 | 33.2 | 32   | 32.9 | 33   | 33.2 |

<sup>a</sup> Reference range: 31–38.6 g/dl [7].

**Table 10**  
Blood platelet count ( $10^3/\mu\text{L}$ )<sup>a</sup> variations in jumping horses subsequent to exercise and a plasmapheresis session.

| Group                | Horse      | Time (Days/Samples) |     |     |     |     |     |     |     |     |     |     |
|----------------------|------------|---------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|                      |            | D-2                 |     | D-1 |     | D0  |     |     | D1  | D2  | D3  | D4  |
|                      |            | S1                  | S2  | S3  | S4  | S5  | S6  | S7  | S8  | S9  | S10 | S11 |
| Control Group        | Acolito    | 172                 | 179 | 171 | 193 | 155 | 173 | 164 | 143 | 158 | 152 | 148 |
|                      | Dahbi      | 152                 | 146 | 146 | 165 | 148 | 145 | 149 | 135 | 139 | 144 | 135 |
|                      | Chamaa     | 125                 | 170 | 136 | 198 | 134 | 164 | 133 | 147 | 158 | 149 | 153 |
|                      | Dahman     | 143                 | 127 | 143 | 119 | 141 | 119 | 131 | 150 | 152 | 148 | 151 |
|                      | Damaa      | 152                 | 170 | 149 | 198 | 134 | 180 | 128 | 139 | 147 | 156 | 163 |
|                      | Dalilano   | 143                 | 127 | 143 | 119 | 141 | 114 | 95  | 152 | 148 | 133 | 77  |
| Plasmapheresis Group | Beluc      | 144                 | 162 | 143 | 134 | 144 | 122 | 138 | 141 | 159 | 170 | 136 |
|                      | Chaddy     | 154                 | 154 | 153 | 157 | 156 | 140 | 156 | 150 | 150 | 104 | 150 |
|                      | Printanier | 159                 | 173 | 161 | 173 | 145 | 171 | 150 | 144 | 148 | 155 | 157 |
|                      | Daoudiya   | 145                 | 151 | 136 | 198 | 134 | 157 | 151 | 151 | 142 | 143 | 110 |
|                      | Camelia    | 125                 | 170 | 136 | 198 | 127 | 186 | 11  | 109 | 111 | 114 | 73  |
|                      | Doualiya   | 157                 | 173 | 179 | 173 | 145 | 171 | 174 | 157 | 168 | 194 | 135 |

<sup>a</sup> Reference range: 100–270  $10^3/\mu\text{L}$  [5].**Table 11**  
White blood cell count ( $10^3/\mu\text{L}$ )<sup>a</sup> changes in jumping horses subsequent to exercise and a plasmapheresis session.

| Group                | Horse      | Time (Days/Samples) |      |      |      |      |      |      |      |      |      |      |
|----------------------|------------|---------------------|------|------|------|------|------|------|------|------|------|------|
|                      |            | D-2                 |      | D-1  |      | D0   |      |      | D1   | D2   | D3   | D4   |
|                      |            | S1                  | S2   | S3   | S4   | S5   | S6   | S7   | S8   | S9   | S10  | S11  |
| Control Group        | Acolito    | 8.7                 | 10.4 | 8.4  | 9.9  | 9.1  | 9.5  | 11.8 | 8.5  | 7.9  | 8.1  | 8    |
|                      | Dahbi      | 5.6                 | 8.1  | 6.3  | 7.7  | 8.2  | 10   | 7.6  | 5.8  | 5.7  | 5.6  | 5.1  |
|                      | Chamaa     | 10.8                | 14.2 | 10.6 | 13.9 | 10.2 | 13.2 | 14.5 | 11.1 | 10.8 | 10.7 | 11   |
|                      | Dahman     | 8                   | 10.1 | 8.4  | 12.1 | 8.5  | 11   | 12.4 | 9.3  | 8.9  | 8.6  | 7.2  |
|                      | Damaa      | 7.9                 | 10.6 | 8.6  | 12.6 | 10.2 | 10.5 | 7.6  | 8.4  | 7.6  | 7.8  | 7.9  |
|                      | Dalilano   | 8.1                 | 10.1 | 8.4  | 12.1 | 10   | 8.9  | 9.9  | 8.9  | 8.6  | 10.2 | 5.9  |
| Plasmapheresis Group | Beluc      | 7.8                 | 7.5  | 8.4  | 7.7  | 9    | 8.1  | 12.6 | 8.7  | 7.8  | 7.6  | 7.6  |
|                      | Chaddy     | 11.1                | 15.3 | 10.6 | 13.4 | 11   | 16.4 | 16.8 | 14.5 | 11.3 | 10.1 | 11.3 |
|                      | Printanier | 9.3                 | 11.7 | 9.4  | 11.6 | 9.9  | 11.8 | 12   | 9.4  | 8.8  | 8.2  | 7.8  |
|                      | Daoudiya   | 8.8                 | 13.8 | 10.6 | 13.9 | 10.7 | 12.3 | 12.5 | 10.3 | 9.8  | 8.1  | 5.8  |
|                      | Camelia    | 10.8                | 14.2 | 10.6 | 13.9 | 10.4 | 14.3 | 14.6 | 9    | 8.6  | 7.8  | 6.9  |
|                      | Doualiya   | 9.4                 | 11.7 | 9.7  | 11.6 | 9.9  | 11.8 | 12.4 | 9.3  | 9.7  | 9.3  | 9    |

<sup>a</sup> Reference range: 5.4–14.3  $10^3/\mu\text{L}$  [5].**Table 12**  
Changes in blood lymphocyte count ( $10^3/\mu\text{L}$ )<sup>a</sup> in jumping horses subsequent to exercise and a plasmapheresis session.

| Group                | Horse      | Time (Days/Samples) |      |     |      |     |      |      |     |     |     |     |
|----------------------|------------|---------------------|------|-----|------|-----|------|------|-----|-----|-----|-----|
|                      |            | D-2                 |      | D-1 |      | D0  |      |      | D1  | D2  | D3  | D4  |
|                      |            | S1                  | S2   | S3  | S4   | S5  | S6   | S7   | S8  | S9  | S10 | S11 |
| Control Group        | Acolito    | 6.9                 | 8.2  | 6.3 | 8.9  | 7.9 | 9.6  | 7.3  | 7.2 | 7   | 6.5 | 6.4 |
|                      | Dahbi      | 5.2                 | 10.6 | 5.6 | 10.3 | 6.4 | 9.1  | 8.3  | 6.2 | 5.5 | 5.6 | 5.7 |
|                      | Chamaa     | 6.9                 | 10.9 | 6.3 | 10.3 | 6.8 | 7.2  | 10.1 | 6.2 | 7.5 | 6.4 | 6.2 |
|                      | Dahman     | 5.9                 | 10.6 | 5.8 | 11.5 | 5.9 | 9.6  | 9.8  | 7.5 | 7.2 | 5.8 | 5.9 |
|                      | Damaa      | 5.3                 | 9.3  | 5.4 | 10.3 | 7.4 | 9.2  | 8.6  | 6.5 | 6.3 | 5.9 | 5.5 |
|                      | Dalilano   | 5.8                 | 9.5  | 6.3 | 6.3  | 6.2 | 9.4  | 9.3  | 7.5 | 6.2 | 5.5 | 6.2 |
| Plasmapheresis Group | Beluc      | 4                   | 7.1  | 6.6 | 7.9  | 8.3 | 8.6  | 8.8  | 7.5 | 6.2 | 5.7 | 5.6 |
|                      | Chaddy     | 12.5                | 9.9  | 5.9 | 9.7  | 6.3 | 6    | 7.2  | 7.9 | 7.8 | 6   | 6.5 |
|                      | Printanier | 5.9                 | 8.8  | 5.8 | 9    | 7.3 | 10.6 | 10.8 | 8.5 | 8.1 | 7.8 | 6   |
|                      | Daoudiya   | 6.9                 | 9.7  | 6.4 | 9.6  | 7.3 | 9.6  | 10.2 | 8.1 | 7.5 | 7.2 | 6.8 |
|                      | Camelia    | 6.4                 | 13.1 | 6.4 | 9.1  | 7.2 | 10.6 | 10.9 | 7.2 | 6.9 | 6.8 | 6.3 |
|                      | Doualiya   | 5.9                 | 9.2  | 5.8 | 10   | 7.9 | 12   | 12.6 | 7   | 6.9 | 6.8 | 5.8 |

<sup>a</sup> Reference range: 1.5–7.7  $10^3/\mu\text{L}$  [6].

**Table 13**Variations of blood Monocyte count ( $10^3/\mu\text{l}$ )<sup>a</sup> in jumping horses subsequent to exercise and a plasmapheresis session.

| Group                | Horse      | Time (Days/Samples) |     |     |     |     |     |     |     |     |     |     |
|----------------------|------------|---------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|                      |            | D-2                 |     | D-1 |     | D0  |     |     | D1  | D2  | D3  | D4  |
|                      |            | S1                  | S2  | S3  | S4  | S5  | S6  | S7  | S8  | S9  | S10 | S11 |
| Control Group        | Acolito    | 0.2                 | 0.3 | 0.2 | 0.2 | 0.2 | 0.3 | 0.4 | 0.2 | 0.2 | 0.3 | 0.4 |
|                      | Dahbi      | 0.3                 | 0.3 | 0.2 | 0.3 | 0.2 | 0.3 | 0.2 | 0.2 | 0.1 | 0.3 | 0.1 |
|                      | Chamaa     | 0.3                 | 0.3 | 0.3 | 0.4 | 0.3 | 0.5 | 0.3 | 0.2 | 0.2 | 0.1 | 0.2 |
|                      | Dahman     | 0.2                 | 0.4 | 0.3 | 0.5 | 0.2 | 0.4 | 0.2 | 0.3 | 0.3 | 0.1 | 0.2 |
|                      | Damaa      | 0.3                 | 0.3 | 0.3 | 0.4 | 0.3 | 0.4 | 0.3 | 0.2 | 0.2 | 0.2 | 0.3 |
|                      | Dalilano   | 0.2                 | 0.4 | 0.3 | 0.5 | 0.2 | 0.5 | 0.2 | 0.3 | 0.3 | 0.3 | 0.1 |
| Plasmapheresis Group | Beluc      | 0.2                 | 0.3 | 0.1 | 0.3 | 0.2 | 0.4 | 0.4 | 0.2 | 0.3 | 0.3 | 0.4 |
|                      | Chaddy     | 0.1                 | 0.3 | 0.1 | 0.3 | 0.2 | 0.6 | 0.5 | 0.4 | 0.3 | 0.1 | 0.4 |
|                      | Printanier | 0.3                 | 0.2 | 0.2 | 0.2 | 0.3 | 0.3 | 0.2 | 0.6 | 0.2 | 0.3 | 0.1 |
|                      | Daoudiya   | 0.2                 | 0.4 | 0.2 | 0.3 | 0.3 | 0.3 | 0.4 | 0.2 | 0.3 | 0.3 | 0.1 |
|                      | Camelia    | 0.3                 | 0.3 | 0.4 | 0.3 | 0.2 | 0.4 | 0.6 | 0.1 | 0.2 | 0.2 | 0.2 |
|                      | Doualiya   | 0.2                 | 0.2 | 0.2 | 0.4 | 0.2 | 0.3 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 |

<sup>a</sup> Reference range: 0–0.8  $10^3/\mu\text{l}$  [8].**Table 14**Blood Eosinophil count ( $10^3/\mu\text{l}$ )<sup>a</sup> changes in jumping horses subsequent to exercise and a plasmapheresis session.

| Group                | Horse      | Time (Days/Samples) |     |     |     |     |     |     |     |     |     |     |
|----------------------|------------|---------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|                      |            | D-2                 |     | D-1 |     | D0  |     |     | D1  | D2  | D3  | D4  |
|                      |            | S1                  | S2  | S3  | S4  | S5  | S6  | S7  | S8  | S9  | S10 | S11 |
| Control Group        | Acolito    | 0.2                 | 0.2 | 0.1 | 0.2 | 0.1 | 0.6 | 0.4 | 0.2 | 0.2 | 0.1 | 0.1 |
|                      | Dahbi      | 0.3                 | 0.2 | 0.4 | 0.4 | 0.3 | 0.9 | 0.5 | 0.1 | 0.2 | 0.3 | 0.3 |
|                      | Chamaa     | 0.3                 | 1.3 | 0.3 | 0.9 | 0.3 | 0.7 | 0.3 | 0.3 | 0.3 | 0.2 | 0.1 |
|                      | Dahman     | 0.3                 | 0.6 | 0.1 | 0.4 | 0.3 | 0.9 | 0.5 | 0.3 | 0.3 | 0.2 | 0.3 |
|                      | Damaa      | 0.3                 | 1.3 | 0.3 | 0.9 | 0.3 | 0.8 | 0.5 | 0.4 | 0.4 | 0.3 | 0.2 |
|                      | Dalilano   | 0.2                 | 0.6 | 0.2 | 0.4 | 0.3 | 0.9 | 0.6 | 0.2 | 0.2 | 0.2 | 0.1 |
| Plasmapheresis Group | Beluc      | 0.3                 | 0.4 | 0.3 | 0.1 | 0.3 | 0.6 | 0.1 | 0.3 | 0.1 | 0   | 0   |
|                      | Chaddy     | 0.1                 | 0.9 | 0.2 | 0.7 | 0.2 | 1.6 | 1.5 | 0.5 | 0.4 | 0.3 | 0.2 |
|                      | Printanier | 0.4                 | 0.8 | 0.3 | 0.9 | 0.3 | 0.8 | 0.9 | 0.4 | 0.1 | 0.3 | 0.5 |
|                      | Daoudiya   | 0.4                 | 1.4 | 0.3 | 0.9 | 0.3 | 0.8 | 0.9 | 0.4 | 0.6 | 0.5 | 0.3 |
|                      | Camelia    | 0.3                 | 1.3 | 0.3 | 0.9 | 0.4 | 1   | 0.8 | 0.3 | 0.7 | 0.2 | 0.3 |
|                      | Doualiya   | 0.2                 | 0.9 | 0.4 | 0.9 | 0.5 | 0.8 | 0.9 | 0.4 | 0.4 | 0.9 | 0.2 |

<sup>a</sup> Reference range: 0–1.0  $10^3/\mu\text{l}$  [6].**Table 15**Blood Granulocyte count ( $10^3/\mu\text{l}$ )<sup>a</sup> variations in jumping horses subsequent to exercise and a plasmapheresis session.

| Group                | Horse      | Time (Days/Samples) |      |     |     |     |      |     |     |     |      |     |
|----------------------|------------|---------------------|------|-----|-----|-----|------|-----|-----|-----|------|-----|
|                      |            | D-2                 |      | D-1 |     | D0  |      |     | D1  | D2  | D3   | D4  |
|                      |            | S1                  | S2   | S3  | S4  | S5  | S6   | S7  | S8  | S9  | S10  | S11 |
| Control Group        | Acolito    | 5.9                 | 6.1  | 5.1 | 9.6 | 5.4 | 5.7  | 6.1 | 5.4 | 5.5 | 5    | 5.3 |
|                      | Dahbi      | 3.2                 | 5.3  | 3   | 5.8 | 1.9 | 2.6  | 3   | 2.6 | 2.9 | 0.5  | 2.6 |
|                      | Chamaa     | 6.1                 | 6.2  | 3.5 | 8.6 | 6.3 | 6.4  | 6.4 | 6.4 | 6.2 | 5.7  | 6.3 |
|                      | Dahman     | 3.7                 | 3.6  | 3.5 | 8.5 | 5.3 | 6.8  | 5.2 | 4.8 | 4.9 | 3.6  | 3.4 |
|                      | Damaa      | 7.9                 | 10.6 | 8.6 | 7.6 | 7.6 | 12.6 | 8.4 | 7.8 | 6.5 | 10.5 | 7.9 |
|                      | Dalilano   | 3.7                 | 3.6  | 6.1 | 3.3 | 5.3 | 6.8  | 4.9 | 3.8 | 4.5 | 2.1  | 2   |
| Plasmapheresis Group | Beluc      | 2.8                 | 5.2  | 5.2 | 6.3 | 6.3 | 6.1  | 6.5 | 6.3 | 4.6 | 4.3  | 5.1 |
|                      | Chaddy     | 2.8                 | 7.4  | 2.5 | 6.5 | 3.4 | 7    | 7.3 | 3.5 | 3.4 | 3.5  | 3.2 |
|                      | Printanier | 4.6                 | 5.2  | 5.7 | 6.3 | 5.1 | 6.5  | 6.3 | 5.1 | 4.8 | 4.2  | 4.1 |
|                      | Daoudiya   | 5.5                 | 6.3  | 5.1 | 6.4 | 6.3 | 6.5  | 6.5 | 6.6 | 5.4 | 4.3  | 2.8 |
|                      | Camelia    | 6.2                 | 7.5  | 6.5 | 7.2 | 3.4 | 7.3  | 7.5 | 4.7 | 4.3 | 4    | 3.2 |
|                      | Doualiya   | 4.6                 | 6.5  | 5.7 | 6.8 | 5.1 | 6.2  | 6.4 | 5   | 5.1 | 5    | 4.6 |

<sup>a</sup> Reference range: 2.3–8.6  $10^3/\mu\text{l}$  [7].



**Table 16**Blood glucose concentration (mmol/L)<sup>a</sup> in jumping horses submitted to plasmapheresis after graded exercise.

| Group                | Horse      | Time (Days/Samples) |     |     |     |     |     |     |     |     |     |     |
|----------------------|------------|---------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|                      |            | D-2                 |     | D-1 |     | D0  |     |     | D1  | D2  | D3  | D4  |
|                      |            | S1                  | S2  | S3  | S4  | S5  | S6  | S7  | S8  | S9  | S10 | S11 |
| Control Group        | Acolito    | 5.2                 | 6   | 4.5 | 6   | 4.5 | 5.6 | 5.7 | 5.7 | 5.6 | 5.5 | 5.6 |
|                      | Dahbi      | 7.2                 | 6   | 4.9 | 5.8 | 4.8 | 6.8 | 5.3 | 5.7 | 5.4 | 5.3 | 5.2 |
|                      | Chamaa     | 5.5                 | 7.1 | 6.2 | 5.8 | 5.3 | 6.9 | 6.2 | 5.8 | 5.3 | 5.6 | 5.9 |
|                      | Dahman     | 4.6                 | 5.6 | 4.5 | 5.7 | 5.3 | 6.3 | 5.7 | 5.4 | 5.3 | 4.9 | 4.8 |
|                      | Damaa      | 5.5                 | 7.1 | 6.2 | 8.2 | 6.6 | 6.2 | 5.8 | 5.6 | 5.3 | 5.6 | 6.2 |
|                      | Dalilano   | 4.6                 | 5.6 | 4.5 | 5.7 | 5.3 | 6.3 | 5.1 | 4.8 | 5.3 | 4.9 | 5.4 |
| Plasmapheresis Group | Beluc      | 4.8                 | 5.6 | 5.3 | 6.3 | 5.4 | 5.2 | 5.4 | 5.2 | 5.1 | 4.9 | 4.6 |
|                      | Chaddy     | 5.6                 | 5.8 | 4.9 | 6.6 | 4.9 | 9.3 | 5.5 | 5.5 | 5.4 | 4.9 | 4.6 |
|                      | Printanier | 3.8                 | 6.5 | 3.6 | 4.5 | 4.5 | 6.4 | 5.7 | 4.8 | 4.7 | 4.6 | 4.6 |
|                      | Daoudiya   | 5.5                 | 7.1 | 6   | 6.3 | 6.1 | 6.3 | 5.5 | 6.8 | 6.7 | 5.9 | 5.6 |
|                      | Camelia    | 7.8                 | 5.3 | 5.5 | 5.6 | 5.4 | 5.4 | 3.6 | 4.8 | 4.7 | 4.8 | 4.7 |
|                      | Doualiya   | 5.8                 | 7.1 | 5.9 | 8.2 | 5.6 | 5.8 | 5.9 | 5   | 4.7 | 4.6 | 5.5 |

<sup>a</sup> Reference range: 3.5–6.0 mmol/L [9].**Table 17**Modifications of blood urea concentrations (mmol/L)<sup>a</sup> in jumping horses subsequent to exercise and a plasmapheresis session.

| Group                | Horse      | Time (Days/Samples) |     |     |     |     |     |     |     |     |     |     |
|----------------------|------------|---------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|                      |            | D-2                 |     | D-1 |     | D0  |     |     | D1  | D2  | D3  | D4  |
|                      |            | S1                  | S2  | S3  | S4  | S5  | S6  | S7  | S8  | S9  | S10 | S11 |
| Control Group        | Acolito    | 4.1                 | 4.2 | 4.1 | 4.1 | 3.8 | 3.9 | 3.9 | 3.8 | 3.9 | 3.8 | 3.6 |
|                      | Dahbi      | 4.8                 | 5.3 | 4.9 | 5.4 | 5.1 | 5.5 | 5.5 | 5.6 | 5.1 | 4.9 | 4.7 |
|                      | Chamaa     | 5.3                 | 5.9 | 5.6 | 6.3 | 6   | 6.2 | 5.8 | 5.6 | 5.3 | 4.6 | 4.7 |
|                      | Dahman     | 5                   | 5.4 | 5.2 | 5.8 | 5.3 | 5.6 | 5.3 | 5.4 | 5.6 | 4.9 | 4.6 |
|                      | Damaa      | 3.9                 | 4.1 | 4   | 4.2 | 4.5 | 5   | 4   | 3.9 | 3.8 | 3.7 | 3.5 |
|                      | Dalilano   | 5                   | 5.4 | 5.1 | 5.8 | 5   | 5.7 | 4.9 | 4.9 | 4.8 | 4.7 | 4.6 |
| Plasmapheresis Group | Beluc      | 4.3                 | 4.9 | 4.6 | 4.7 | 4   | 4.2 | 3.6 | 3.2 | 3.8 | 3.7 | 3.2 |
|                      | Chaddy     | 3.9                 | 3.9 | 4   | 4.3 | 3.8 | 3.9 | 3.2 | 3.5 | 3.2 | 3   | 3.1 |
|                      | Printanier | 4.5                 | 4.6 | 4.8 | 5   | 5.1 | 5.8 | 4.9 | 4   | 4.1 | 4.1 | 4   |
|                      | Daoudiya   | 3.8                 | 4.1 | 3.9 | 4.2 | 4.6 | 5.3 | 5   | 5.1 | 5.3 | 4.2 | 3.1 |
|                      | Camelia    | 6                   | 6.5 | 6   | 6.5 | 6.3 | 7.8 | 6.3 | 5.6 | 5.4 | 5.6 | 5.6 |
|                      | Doualiya   | 5.1                 | 5.2 | 5.1 | 5.2 | 4.9 | 4.6 | 4.3 | 4.2 | 4   | 4.1 | 4   |

<sup>a</sup> Reference range: 1.2 à 3.6 mmol/L [9].**Table 18**Changes in blood creatinine concentrations (mg/dL)<sup>a</sup> in jumping horses subsequent to exercise and a plasmapheresis session.

| Group                | Horse      | Time (Days/Samples) |     |     |     |     |     |     |     |     |     |     |
|----------------------|------------|---------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|                      |            | D-2                 |     | D-1 |     | D0  |     |     | D1  | D2  | D3  | D4  |
|                      |            | S1                  | S2  | S3  | S4  | S5  | S6  | S7  | S8  | S9  | S10 | S11 |
| Control Group        | Acolito    | 1.9                 | 2.2 | 1.9 | 2   | 2   | 2.4 | 2   | 1.8 | 1.9 | 2   | 2.1 |
|                      | Dahbi      | 1.7                 | 1.9 | 1.8 | 2.1 | 2   | 2.3 | 2.1 | 2   | 2.3 | 2.1 | 2   |
|                      | Chamaa     | 1.2                 | 1.7 | 1.2 | 1.9 | 1.3 | 1.8 | 1.3 | 1.8 | 1.7 | 1.5 | 1.4 |
|                      | Dahman     | 1.8                 | 2.5 | 1.9 | 2.4 | 1.8 | 1.9 | 2   | 1.6 | 1.7 | 1.8 | 1.6 |
|                      | Damaa      | 1.4                 | 1.7 | 1.4 | 1.9 | 1.5 | 2   | 2.2 | 1.8 | 1.7 | 1.5 | 1.6 |
|                      | Dalilano   | 1.8                 | 2.5 | 1.9 | 2.4 | 2.1 | 2.2 | 2.1 | 1.8 | 1.7 | 1.8 | 1.5 |
| Plasmapheresis Group | Beluc      | 1.6                 | 2.3 | 1.7 | 2   | 1.6 | 1.9 | 1.8 | 1.8 | 1.7 | 1.8 | 1.8 |
|                      | Chaddy     | 1.5                 | 1.5 | 1.5 | 1.8 | 1.6 | 2   | 1.7 | 1.6 | 1.6 | 1.5 | 1.4 |
|                      | Printanier | 1.7                 | 2.3 | 1.5 | 2.3 | 1.8 | 2.2 | 1.8 | 1.7 | 1.8 | 1.7 | 1.8 |
|                      | Daoudiya   | 1.3                 | 1.7 | 1.3 | 1.9 | 1.4 | 2.3 | 1.9 | 1.6 | 1.7 | 1.6 | 1.6 |
|                      | Camelia    | 1.4                 | 1.6 | 1.7 | 1.9 | 1.5 | 1.5 | 1.4 | 1.5 | 1.3 | 1.4 | 1.3 |
|                      | Doualiya   | 1.6                 | 1.7 | 1.5 | 1.9 | 1.5 | 1.5 | 1.4 | 1.4 | 1.8 | 1.7 | 1.5 |

<sup>a</sup> Reference range: 0.8–1.5 mg/dl [10].

**Table 19**Blood Alkaline phosphatase concentrations (U/L)<sup>a</sup> in jumping horses subsequent to exercise and a plasmapheresis session.

| Group                | Horse      | Time (Days/Samples) |     |     |     |     |     |     |     |     |     |     |
|----------------------|------------|---------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|                      |            | D-2                 |     | D-1 |     | D0  |     |     | D1  | D2  | D3  | D4  |
|                      |            | S1                  | S2  | S3  | S4  | S5  | S6  | S7  | S8  | S9  | S10 | S11 |
| Control Group        | Acolito    | 158                 | 162 | 141 | 184 | 145 | 174 | 174 | 159 | 158 | 159 | 160 |
|                      | Dahbi      | 84                  | 98  | 88  | 88  | 86  | 112 | 102 | 96  | 95  | 93  | 93  |
|                      | Chamaa     | 117                 | 141 | 127 | 144 | 140 | 154 | 150 | 132 | 139 | 140 | 141 |
|                      | Dahman     | 110                 | 124 | 141 | 142 | 140 | 142 | 130 | 129 | 123 | 110 | 101 |
|                      | Damaa      | 117                 | 141 | 127 | 144 | 140 | 136 | 143 | 141 | 139 | 140 | 122 |
|                      | Dalilano   | 110                 | 112 | 112 | 142 | 111 | 125 | 124 | 124 | 123 | 110 | 118 |
| Plasmapheresis Group | Beluc      | 100                 | 104 | 140 | 156 | 135 | 140 | 164 | 137 | 136 | 132 | 129 |
|                      | Chaddy     | 131                 | 139 | 88  | 156 | 136 | 177 | 141 | 141 | 132 | 129 | 121 |
|                      | Printanier | 110                 | 113 | 111 | 117 | 115 | 119 | 117 | 112 | 111 | 112 | 110 |
|                      | Daoudiya   | 117                 | 141 | 127 | 144 | 140 | 147 | 123 | 111 | 111 | 110 | 110 |
|                      | Camelia    | 161                 | 139 | 160 | 142 | 159 | 140 | 148 | 171 | 165 | 169 | 146 |
|                      | Doualiya   | 116                 | 141 | 127 | 144 | 140 | 126 | 133 | 123 | 111 | 112 | 110 |

<sup>a</sup> Reference value: < 250U/L [5].**Table 20**Blood Gama Glutamyl Transferase concentrations (U/L)<sup>a</sup> in jumping horses subsequent to exercise and a plasmapheresis session.

| Group                | Horse      | Time (Days/Samples) |    |     |    |    |    |    |    |    |     |     |
|----------------------|------------|---------------------|----|-----|----|----|----|----|----|----|-----|-----|
|                      |            | D-2                 |    | D-1 |    | D0 |    |    | D1 | D2 | D3  | D4  |
|                      |            | S1                  | S2 | S3  | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 |
| Control Group        | Acolito    | 10                  | 10 | 10  | 10 | 10 | 10 | 10 | 10 | 10 | 10  | 10  |
|                      | Dahbi      | 10                  | 10 | 10  | 10 | 10 | 10 | 10 | 10 | 10 | 10  | 10  |
|                      | Chamaa     | 11                  | 14 | 15  | 18 | 18 | 22 | 17 | 16 | 10 | 12  | 13  |
|                      | Dahman     | 10                  | 10 | 10  | 10 | 10 | 10 | 10 | 10 | 10 | 10  | 10  |
|                      | Damaa      | 11                  | 14 | 15  | 18 | 18 | 11 | 10 | 10 | 10 | 12  | 10  |
|                      | Dalilano   | 10                  | 10 | 10  | 10 | 10 | 13 | 10 | 10 | 10 | 10  | 10  |
| Plasmapheresis Group | Beluc      | 10                  | 10 | 10  | 10 | 10 | 10 | 10 | 10 | 10 | 10  | 10  |
|                      | Chaddy     | 10                  | 10 | 10  | 10 | 10 | 15 | 10 | 13 | 12 | 12  | 12  |
|                      | Printanier | 10                  | 10 | 11  | 12 | 10 | 13 | 10 | 10 | 10 | 10  | 10  |
|                      | Daoudiya   | 11                  | 14 | 15  | 18 | 18 | 13 | 14 | 11 | 11 | 10  | 10  |
|                      | Camelia    | 10                  | 12 | 13  | 11 | 12 | 10 | 10 | 10 | 11 | 11  | 10  |
|                      | Doualiya   | 11                  | 10 | 10  | 18 | 18 | 11 | 11 | 10 | 10 | 10  | 10  |

<sup>a</sup> Reference value: <30 U/l [5].**Table 21**Blood Total bilirubin concentrations (mg/dL)<sup>a</sup> in jumping horses subsequent to exercise and a plasmapheresis session.

| Group                | Horse      | Time (Days/Samples) |      |     |     |     |     |     |     |     |     |     |
|----------------------|------------|---------------------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|                      |            | D-2                 |      | D-1 |     | D0  |     |     | D1  | D2  | D3  | D4  |
|                      |            | S1                  | S2   | S3  | S4  | S5  | S6  | S7  | S8  | S9  | S10 | S11 |
| Control Group        | Acolito    | 2.2                 | 2.5  | 1.9 | 2.5 | 2.4 | 2.3 | 2.3 | 2.2 | 2.2 | 2.4 | 2.3 |
|                      | Dahbi      | 1.7                 | 3.8  | 1.6 | 1.7 | 1.6 | 1.6 | 2.3 | 2.1 | 2   | 1.8 | 1.3 |
|                      | Chamaa     | 1.2                 | 1.7  | 1.2 | 1.5 | 1.2 | 1.2 | 1.3 | 1.6 | 1.7 | 1.5 | 1.4 |
|                      | Dahman     | 1.6                 | 1.8  | 1.9 | 2.6 | 2.2 | 3.2 | 1.8 | 1.9 | 1.5 | 1.6 | 1.4 |
|                      | Damaa      | 1.2                 | 1.7  | 1.2 | 1.5 | 1.4 | 1.2 | 2.6 | 2.3 | 1.7 | 1.5 | 1.7 |
|                      | Dalilano   | 1.6                 | 1.8  | 1.9 | 2.6 | 1.6 | 3.2 | 1.9 | 1.2 | 1.5 | 1.6 | 1.2 |
| Plasmapheresis Group | Beluc      | 3.1                 | 1.9  | 3.2 | 3.7 | 3.5 | 3.2 | 3.1 | 2.6 | 2.1 | 2.3 | 1.5 |
|                      | Chaddy     | 1.7                 | 1.9  | 1.6 | 1.8 | 1.6 | 2   | 2.1 | 1.6 | 1.7 | 1.8 | 1.6 |
|                      | Printanier | 0.7                 | 2.1  | 1.9 | 2   | 2.1 | 2.1 | 2.2 | 1.7 | 1.6 | 1.5 | 0.8 |
|                      | Daoudiya   | 1.2                 | 2    | 1.2 | 1.5 | 1.2 | 1.7 | 1.8 | 1.7 | 1.6 | 1.3 | 1.1 |
|                      | Camelia    | 1.6                 | 2.3  | 1.4 | 1.6 | 1.5 | 1.7 | 1.6 | 1.6 | 1.6 | 1.5 | 1.8 |
|                      | Doualiya   | 1.6                 | 2.45 | 1.5 | 1.5 | 1.2 | 1.6 | 1   | 1.7 | 1.7 | 1.7 | 1.6 |

<sup>a</sup> Reference value: 0.5–2.1 mg/dl [10].

**Table 22**  
Blood Sodium concentrations (mmol/L)<sup>a</sup> in jumping horses subsequent to exercise and a plasmapheresis session.

| Group                | Horse      | Time (Days/Samples) |     |     |     |     |     |     |     |     |     |     |
|----------------------|------------|---------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|                      |            | D-2                 |     | D-1 |     | D0  |     |     | D1  | D2  | D3  | D4  |
|                      |            | S1                  | S2  | S3  | S4  | S5  | S6  | S7  | S8  | S9  | S10 | S11 |
| Control Group        | Acolito    | 138                 | 143 | 138 | 144 | 143 | 143 | 138 | 138 | 142 | 143 | 144 |
|                      | Dahbi      | 146                 | 139 | 139 | 139 | 138 | 144 | 140 | 138 | 143 | 145 | 144 |
|                      | Chamaa     | 138                 | 146 | 142 | 153 | 142 | 146 | 140 | 138 | 142 | 146 | 144 |
|                      | Dahman     | 138                 | 143 | 138 | 142 | 139 | 149 | 139 | 138 | 129 | 121 | 123 |
|                      | Damaa      | 138                 | 146 | 142 | 153 | 142 | 149 | 138 | 146 | 142 | 146 | 142 |
|                      | Dalilano   | 138                 | 151 | 138 | 142 | 136 | 140 | 139 | 139 | 136 | 138 | 140 |
| Plasmapheresis Group | Beluc      | 136                 | 146 | 146 | 146 | 142 | 147 | 148 | 144 | 141 | 139 | 133 |
|                      | Chaddy     | 143                 | 142 | 139 | 144 | 139 | 146 | 150 | 146 | 143 | 139 | 137 |
|                      | Printanier | 145                 | 149 | 144 | 145 | 146 | 145 | 149 | 145 | 145 | 149 | 150 |
|                      | Daoudiya   | 138                 | 145 | 142 | 146 | 145 | 148 | 148 | 147 | 142 | 139 | 138 |
|                      | Camelia    | 142                 | 145 | 140 | 146 | 139 | 145 | 147 | 146 | 143 | 140 | 148 |
|                      | Doualiya   | 148                 | 146 | 141 | 146 | 146 | 144 | 147 | 146 | 145 | 149 | 141 |

<sup>a</sup> Reference range: 132–142 mmol/L [11,12].**Table 23**  
Blood Potassium concentrations (mmol/L)<sup>a</sup> in jumping horses submitted to plasmapheresis after graded exercise.

| Group                | Horse      | Time (Days/Samples) |     |     |     |     |     |     |     |     |     |     |
|----------------------|------------|---------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|                      |            | D-2                 |     | D-1 |     | D0  |     |     | D1  | D2  | D3  | D4  |
|                      |            | S1                  | S2  | S3  | S4  | S5  | S6  | S7  | S8  | S9  | S10 | S11 |
| Control Group        | Acolito    | 4.4                 | 4.6 | 4.3 | 4.7 | 4.2 | 4.7 | 4.6 | 4.5 | 4.7 | 3.5 | 3.1 |
|                      | Dahbi      | 4.4                 | 4.7 | 4.4 | 4.5 | 4.1 | 4.3 | 4.1 | 4.3 | 4.4 | 4.5 | 4.8 |
|                      | Chamaa     | 3.6                 | 4.3 | 4.1 | 4.2 | 4.4 | 4.8 | 4.3 | 3.9 | 3   | 3.2 | 3.3 |
|                      | Dahman     | 4.2                 | 4.6 | 4.5 | 4.6 | 4.7 | 4.9 | 4.5 | 3.5 | 3.5 | 3.8 | 3.9 |
|                      | Damaa      | 3.6                 | 4.5 | 4.1 | 4.2 | 4.4 | 5.2 | 5.1 | 4.6 | 4.6 | 4.5 | 3.1 |
|                      | Dalilano   | 4.2                 | 4.6 | 4.5 | 4.6 | 4.7 | 5.1 | 5   | 4.8 | 3   | 3.2 | 3   |
| Plasmapheresis Group | Beluc      | 4.4                 | 4.7 | 4.7 | 4.6 | 4.2 | 4.9 | 4.1 | 4.9 | 4.3 | 4.2 | 4.2 |
|                      | Chaddy     | 3.9                 | 4.3 | 4.2 | 4.1 | 3.9 | 4.8 | 4.1 | 4.3 | 4.2 | 4.4 | 4.5 |
|                      | Printanier | 4.2                 | 4.8 | 5.3 | 5.1 | 4.8 | 5.2 | 4.1 | 3.1 | 3.6 | 3.2 | 2.7 |
|                      | Daoudiya   | 3.8                 | 4.6 | 4.2 | 4.6 | 4.4 | 5.5 | 4.2 | 3.4 | 3.3 | 3.3 | 2.2 |
|                      | Camelia    | 4                   | 4.6 | 3.6 | 4.3 | 4.2 | 3.5 | 3.6 | 4.7 | 3.6 | 3.6 | 3.8 |
|                      | Doualiya   | 4.2                 | 4.5 | 4.2 | 4.2 | 4.4 | 4.4 | 4.1 | 3.1 | 3.3 | 3.2 | 4.1 |

<sup>a</sup> Reference range: 3.8–5.2 mmol/L [9].**Table 24**  
Blood Calcium concentrations (mg/dL)<sup>a</sup> in jumping horses subsequent to exercise and a plasmapheresis session.

| Group                | Horse      | Time (Days/Samples) |      |      |      |      |      |      |      |      |      |      |
|----------------------|------------|---------------------|------|------|------|------|------|------|------|------|------|------|
|                      |            | D-2                 |      | D-1  |      | D0   |      |      | D1   | D2   | D3   | D4   |
|                      |            | S1                  | S2   | S3   | S4   | S5   | S6   | S7   | S8   | S9   | S10  | S11  |
| Control Group        | Acolito    | 11                  | 12   | 11.6 | 12   | 11.3 | 12.2 | 11.9 | 11.3 | 11.8 | 11.9 | 11.9 |
|                      | Dahbi      | 11.9                | 12   | 11   | 11.9 | 11.3 | 11   | 11.6 | 11.9 | 11.6 | 11.7 | 11.8 |
|                      | Chamaa     | 11.3                | 12   | 11.6 | 12.1 | 11.2 | 11.8 | 10.9 | 11.6 | 11.5 | 11.9 | 12   |
|                      | Dahman     | 11.3                | 12.6 | 11.2 | 11.6 | 11.4 | 12.3 | 11.6 | 11.1 | 11.8 | 11.3 | 11.3 |
|                      | Damaa      | 11.9                | 12.3 | 11.6 | 12.1 | 11.3 | 12.2 | 11.9 | 11.8 | 11.5 | 11.9 | 11.2 |
|                      | Dalilano   | 11.3                | 11.5 | 11   | 11.4 | 11.4 | 11.7 | 11.3 | 11.6 | 11.8 | 11.3 | 11.4 |
| Plasmapheresis Group | Beluc      | 11.7                | 12   | 11.6 | 12   | 11.6 | 11.9 | 11.5 | 11.5 | 11.5 | 11.6 | 11.7 |
|                      | Chaddy     | 11.3                | 11.6 | 11.3 | 12   | 11.5 | 12.3 | 10.4 | 10.6 | 10.5 | 11.2 | 11.3 |
|                      | Printanier | 11                  | 12.2 | 11   | 12.3 | 11.4 | 11.9 | 11.3 | 11.8 | 11.8 | 10.6 | 10.8 |
|                      | Daoudiya   | 11.5                | 12   | 11.2 | 12.1 | 11.3 | 12.3 | 11.4 | 11.9 | 11.6 | 11.5 | 11.2 |
|                      | Camelia    | 10.5                | 11.3 | 10.8 | 12.3 | 11.1 | 12   | 10.9 | 10.7 | 10.8 | 10.6 | 11.2 |
|                      | Doualiya   | 11.3                | 12   | 11.2 | 12.3 | 11.3 | 12.3 | 10.3 | 11.6 | 11   | 11.8 | 11.2 |

<sup>a</sup> Reference range: 10.8–12.9 mg/dL [10].

**Table 25**Plasma albumin (g/L)<sup>a</sup> changes in jumping horses subsequent to exercise and a plasmapheresis session.

| Group                | Horse      | Time (Days/Samples) |    |     |    |    |    |    |    |    |     |     |
|----------------------|------------|---------------------|----|-----|----|----|----|----|----|----|-----|-----|
|                      |            | D-2                 |    | D-1 |    | D0 |    |    | D1 | D2 | D3  | D4  |
|                      |            | S1                  | S2 | S3  | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 |
| Control Group        | Acolito    | 34                  | 37 | 32  | 37 | 33 | 36 | 36 | 33 | 34 | 35  | 33  |
|                      | Dahbi      | 36                  | 41 | 34  | 37 | 36 | 38 | 38 | 35 | 33 | 33  | 34  |
|                      | Chamaa     | 35                  | 39 | 36  | 37 | 38 | 38 | 38 | 38 | 33 | 35  | 37  |
|                      | Dahman     | 32                  | 39 | 32  | 38 | 33 | 39 | 37 | 36 | 35 | 37  | 29  |
|                      | Damaa      | 35                  | 39 | 36  | 37 | 38 | 38 | 35 | 37 | 36 | 36  | 35  |
|                      | Dalilano   | 33                  | 39 | 32  | 38 | 33 | 38 | 36 | 32 | 35 | 36  | 30  |
| Plasmapheresis Group | Beluc      | 34                  | 38 | 35  | 38 | 35 | 36 | 30 | 34 | 35 | 36  | 34  |
|                      | Chaddy     | 36                  | 38 | 34  | 39 | 35 | 42 | 32 | 36 | 36 | 38  | 33  |
|                      | Printanier | 31                  | 34 | 32  | 35 | 32 | 36 | 26 | 32 | 31 | 32  | 32  |
|                      | Daoudiya   | 35                  | 39 | 36  | 37 | 38 | 39 | 28 | 35 | 34 | 33  | 34  |
|                      | Camelia    | 36                  | 32 | 37  | 30 | 35 | 31 | 26 | 34 | 35 | 32  | 32  |
|                      | Doualiya   | 31                  | 39 | 29  | 37 | 38 | 33 | 25 | 31 | 31 | 32  | 32  |

<sup>a</sup> Reference range: 26–37g/L [5].**Table 26**Plasma globulin (g/L)<sup>a</sup> changes in jumping horses subsequent to exercise and a plasmapheresis session.

| Group                | Horse      | Time (Days/Samples) |    |     |    |    |    |    |    |    |     |     |
|----------------------|------------|---------------------|----|-----|----|----|----|----|----|----|-----|-----|
|                      |            | D-2                 |    | D-1 |    | D0 |    |    | D1 | D2 | D3  | D4  |
|                      |            | S1                  | S2 | S3  | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 |
| Control Group        | Acolito    | 33                  | 36 | 31  | 35 | 31 | 36 | 33 | 32 | 33 | 34  | 35  |
|                      | Dahbi      | 31                  | 38 | 29  | 30 | 31 | 35 | 31 | 31 | 32 | 34  | 32  |
|                      | Chamaa     | 34                  | 37 | 33  | 35 | 33 | 38 | 39 | 34 | 33 | 32  | 33  |
|                      | Dahman     | 28                  | 37 | 31  | 35 | 34 | 36 | 38 | 35 | 34 | 36  | 37  |
|                      | Damaa      | 34                  | 37 | 33  | 35 | 33 | 38 | 39 | 33 | 32 | 33  | 32  |
|                      | Dalilano   | 28                  | 37 | 31  | 35 | 34 | 38 | 32 | 33 | 32 | 32  | 33  |
| Plasmapheresis Group | Beluc      | 34                  | 35 | 34  | 38 | 33 | 30 | 28 | 30 | 33 | 36  | 31  |
|                      | Chaddy     | 25                  | 42 | 29  | 46 | 36 | 47 | 23 | 28 | 29 | 26  | 29  |
|                      | Printanier | 30                  | 33 | 33  | 35 | 30 | 35 | 26 | 30 | 34 | 33  | 34  |
|                      | Daoudiya   | 34                  | 37 | 33  | 35 | 33 | 38 | 32 | 30 | 29 | 27  | 26  |
|                      | Camelia    | 30                  | 32 | 32  | 31 | 39 | 32 | 27 | 39 | 34 | 33  | 35  |
|                      | Doualiya   | 34                  | 37 | 36  | 35 | 33 | 41 | 32 | 34 | 29 | 27  | 28  |

<sup>a</sup> Reference range: 25–45 g/L [5].**Table 27**Changes in Plasma total protein concentrations (g/L)<sup>a</sup> in jumping horses subsequent to exercise and a plasmapheresis session.

| Group                | Horse      | Time (Days/Samples) |    |     |    |    |    |    |    |    |     |     |
|----------------------|------------|---------------------|----|-----|----|----|----|----|----|----|-----|-----|
|                      |            | D-2                 |    | D-1 |    | D0 |    |    | D1 | D2 | D3  | D4  |
|                      |            | S1                  | S2 | S3  | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 |
| Control Group        | Acolito    | 68                  | 73 | 63  | 72 | 64 | 72 | 70 | 67 | 63 | 62  | 63  |
|                      | Dahbi      | 74                  | 79 | 73  | 67 | 73 | 73 | 72 | 71 | 71 | 71  | 71  |
|                      | Chamaa     | 72                  | 76 | 71  | 76 | 71 | 76 | 76 | 73 | 73 | 69  | 70  |
|                      | Dahman     | 64                  | 76 | 65  | 78 | 65 | 75 | 72 | 66 | 67 | 68  | 68  |
|                      | Damaa      | 70                  | 76 | 74  | 76 | 70 | 76 | 70 | 73 | 74 | 73  | 73  |
|                      | Dalilano   | 66                  | 76 | 66  | 78 | 65 | 74 | 70 | 67 | 62 | 64  | 63  |
| Plasmapheresis Group | Beluc      | 68                  | 73 | 69  | 76 | 68 | 66 | 66 | 67 | 67 | 65  | 69  |
|                      | Chaddy     | 80                  | 80 | 63  | 85 | 65 | 89 | 64 | 66 | 68 | 69  | 65  |
|                      | Printanier | 61                  | 67 | 64  | 68 | 62 | 71 | 70 | 72 | 68 | 70  | 74  |
|                      | Daoudiya   | 69                  | 76 | 74  | 76 | 71 | 77 | 68 | 70 | 72 | 68  | 69  |
|                      | Camelia    | 75                  | 62 | 76  | 61 | 74 | 63 | 64 | 73 | 68 | 74  | 73  |
|                      | Doualiya   | 65                  | 76 | 65  | 76 | 71 | 74 | 63 | 66 | 68 | 68  | 68  |

<sup>a</sup> Reference range: 62.5–75.0 g/L [13].

**Table 28**Changes in blood aspartate Amino-transferase concentrations (U/L)<sup>a</sup> in jumping horses subsequent to exercise and a plasmapheresis session.

| Group                | Horse      | Time |     |     |     |     |     |     |     |     |     |     |
|----------------------|------------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|                      |            | D-2  |     | D-1 |     | D0  |     |     | D1  | D2  | D3  | D4  |
|                      |            | S1   | S2  | S3  | S4  | S5  | S6  | S7  | S8  | S9  | S10 | S11 |
| Control Group        | Acolito    | 242  | 275 | 276 | 285 | 283 | 304 | 302 | 287 | 279 | 275 | 274 |
|                      | Dahbi      | 311  | 350 | 293 | 331 | 350 | 359 | 354 | 338 | 336 | 334 | 332 |
|                      | Chamaa     | 310  | 365 | 352 | 388 | 365 | 391 | 380 | 378 | 344 | 345 | 348 |
|                      | Dahman     | 192  | 251 | 254 | 263 | 255 | 267 | 282 | 256 | 246 | 232 | 226 |
|                      | Damaa      | 310  | 365 | 375 | 388 | 345 | 352 | 370 | 369 | 355 | 345 | 334 |
| Plasmapheresis Group | Dalilano   | 192  | 251 | 259 | 263 | 350 | 362 | 378 | 380 | 360 | 346 | 325 |
|                      | Beluc      | 165  | 348 | 212 | 215 | 219 | 223 | 230 | 219 | 230 | 223 | 240 |
|                      | Chaddy     | 231  | 245 | 275 | 289 | 296 | 309 | 221 | 227 | 233 | 236 | 220 |
|                      | Printanier | 300  | 310 | 325 | 349 | 358 | 359 | 295 | 315 | 321 | 305 | 318 |
|                      | Daoudiya   | 310  | 365 | 372 | 388 | 376 | 387 | 289 | 299 | 304 | 301 | 302 |
|                      | Camelia    | 357  | 319 | 359 | 312 | 345 | 355 | 201 | 221 | 232 | 226 | 210 |
|                      | Doualiya   | 335  | 365 | 375 | 388 | 389 | 400 | 230 | 238 | 256 | 306 | 235 |

<sup>a</sup> Reference range: 160–412 U/L [11,12].**Table 29**Variations of blood creatine kinase concentrations (U/L)<sup>a</sup> in jumping horses subsequent to exercise and a plasmapheresis session.

| Group                | Horse      | Time (Days/Samples) |     |     |     |     |     |     |     |     |     |     |
|----------------------|------------|---------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|                      |            | D-2                 |     | D-1 |     | D0  |     |     | D1  | D2  | D3  | D4  |
|                      |            | S1                  | S2  | S3  | S4  | S5  | S6  | S7  | S8  | S9  | S10 | S11 |
| Control Group        | Acolito    | 165                 | 180 | 172 | 182 | 136 | 135 | 274 | 212 | 182 | 174 | 169 |
|                      | Dahbi      | 150                 | 160 | 151 | 168 | 152 | 175 | 165 | 166 | 165 | 165 | 153 |
|                      | Chamaa     | 149                 | 230 | 156 | 268 | 179 | 231 | 133 | 154 | 150 | 136 | 152 |
|                      | Dahman     | 112                 | 210 | 212 | 250 | 172 | 205 | 189 | 212 | 201 | 196 | 189 |
|                      | Damaa      | 149                 | 169 | 156 | 162 | 179 | 201 | 200 | 189 | 169 | 156 | 146 |
| Plasmapheresis Group | Dalilano   | 123                 | 215 | 212 | 262 | 172 | 250 | 212 | 236 | 226 | 212 | 189 |
|                      | Beluc      | 120                 | 160 | 125 | 189 | 153 | 159 | 105 | 111 | 110 | 110 | 112 |
|                      | Chaddy     | 122                 | 201 | 191 | 203 | 135 | 183 | 109 | 102 | 112 | 120 | 121 |
|                      | Printanier | 123                 | 151 | 128 | 159 | 132 | 149 | 110 | 103 | 114 | 117 | 120 |
|                      | Daoudiya   | 123                 | 146 | 156 | 156 | 179 | 196 | 123 | 102 | 123 | 120 | 120 |
|                      | Camelia    | 306                 | 315 | 302 | 332 | 151 | 220 | 132 | 103 | 114 | 116 | 123 |
|                      | Doualiya   | 149                 | 212 | 146 | 232 | 179 | 202 | 132 | 123 | 112 | 115 | 123 |

<sup>a</sup> Reference range: 60–330 U/L [11,12].**Table 30**Changes in blood lactate concentrations (mmol/L)<sup>a</sup> in jumping horses subsequent to exercise and a plasmapheresis session.

| Group                | Horse      | Time (Days/Samples) |      |     |      |     |      |     |     |     |     |     |
|----------------------|------------|---------------------|------|-----|------|-----|------|-----|-----|-----|-----|-----|
|                      |            | D-2                 |      | D-1 |      | D0  |      |     | D1  | D2  | D3  | D4  |
|                      |            | S1                  | S2   | S3  | S4   | S5  | S6   | S7  | S8  | S9  | S10 | S11 |
| Control Group        | Acolito    | 1                   | 13.7 | 1.1 | 13.5 | 1   | 11.4 | 2.4 | 1   | 1   | 1   | 1   |
|                      | Dahbi      | 1.2                 | 15.2 | 1.2 | 14.2 | 1.3 | 12.6 | 2.2 | 1.2 | 1.3 | 1.2 | 1.3 |
|                      | Chamaa     | 1.1                 | 15.4 | 1   | 16.9 | 1   | 17.8 | 3.4 | 1.1 | 1.1 | 1   | 1.1 |
|                      | Dahman     | 1                   | 14.8 | 1   | 14.6 | 1   | 14.7 | 3.1 | 1.1 | 1   | 1   | 1.1 |
|                      | Damaa      | 1.1                 | 18.2 | 1.1 | 19.6 | 1.2 | 20.9 | 4.1 | 1.2 | 1.1 | 1.1 | 1.1 |
| Plasmapheresis Group | Dalilano   | 1                   | 18.6 | 1.1 | 20.1 | 1.1 | 19.7 | 3.9 | 1.1 | 1.1 | 1   | 1.1 |
|                      | Beluc      | 1                   | 13.2 | 1   | 13.3 | 1   | 14.5 | 1.1 | 1   | 0.9 | 0.9 | 0.9 |
|                      | Chaddy     | 1.1                 | 13.5 | 1   | 16   | 1   | 14.3 | 1.2 | 1.1 | 1.1 | 1.1 | 1   |
|                      | Printanier | 1                   | 23.4 | 1.3 | 21.9 | 1.2 | 24.5 | 1.3 | 1.1 | 1.1 | 0.9 | 0.9 |
|                      | Daoudiya   | 1                   | 14.7 | 1   | 14.9 | 1   | 15.1 | 1.1 | 1   | 0.8 | 0.8 | 0.9 |
|                      | Camelia    | 1.2                 | 19.6 | 1.1 | 20.8 | 1   | 21.1 | 1.1 | 1.1 | 1   | 1   | 1   |
|                      | Doualiya   | 1.2                 | 17.9 | 1.1 | 18.1 | 1.2 | 18.4 | 1.1 | 1   | 0.9 | 0.8 | 0.9 |

<sup>a</sup> Reference value: < 2.5 mmol/L [9].

## 2. Experimental design, materials, and methods

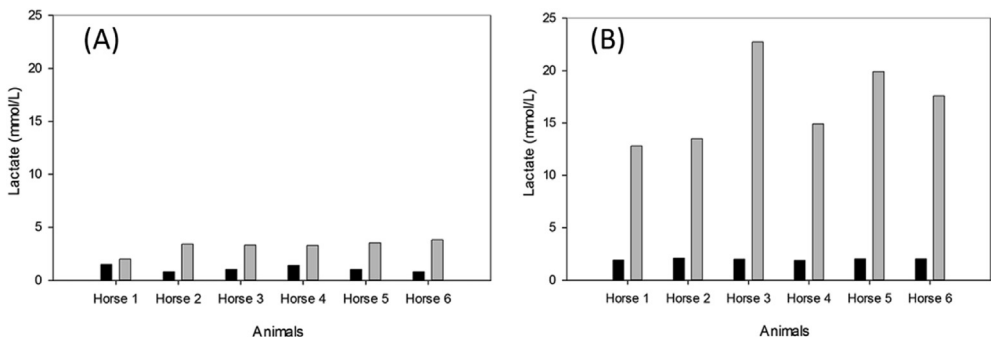
Investigations were carried out on twelve show jumping horses randomly allocated to two groups: a plasmapheresis group ( $n = 6$ ) and a control group ( $n = 6$ ). All horses were healthy and received the same food diet three times a day. First in the morning, they were offered each 1 kg of commercial feed (Destrier, France). Then, in midday, they received each 2.5 kg of barley and its bran (0.5 kg) in addition to 30 g of a vitamin and mineral supplement. Finally, in the evening, horses were fed each 0.5 kg of oats and 2 kg of barley. A supplement of 2.5 kg of alfalfa hay was given for each horse after each food ration distribution. Water was provided ad-libitum.

Horses of both groups underwent each morning an exercise of 30 min/day, during 3 successive days (Day  $-2$ ,  $-1$  and 0). Blood was sampled before and after exercise. Following the 3rd day exercise (Day 0) and its corresponding subsequent blood sampling, a plasmapheresis session was performed on the horses of the plasmapheresis group while horses of the control group were maintained in the same experimental environment but without being subjected to plasmapheresis. Then blood was sampled from each horse of both groups. Subsequent daily blood samples were taken at the same hour for the following 4 days (Day 1, 2, 3 and 4). All blood samples were obtained using jugular venipuncture. Sampling was realised in the morning between the two first food diets of the day.

In order to verify the effect of plasmapheresis, the physical exercise executed by horses have to comply the condition of inducing a significant raise of several hematobiochemical parameters and specifically providing moderate to high values of lactates. The well-known triangular exercise carried out in the trotter horses by Demonceau and Auvinet [2] have been first used. This exercise corresponds to succession of warm-up period (15 minutes) and 11 minutes of workloads exercise (steps) and then a recovery period of 10 minutes. Data of lactate concentrations obtained from blood samples taken 5–10 minutes after exercise test finished varied from 2.0 and 3.7 mmol/L (Fig. 1B). To obtain high values of lactates, the previous exercise test was modified by increasing the duration of the warm-up phase up to 30 min and steps were substituted by gallop. The new warm-up stage consisted on 5 min trot, 3 min of gallop, 5 min of trot, 3 min of gallop and finally 6 min of trot. The speeds of horses at trot was 240 m/min while it was 350 m/min for gallop. Data of blood lactate concentrations increased by 6 times (Fig. 1B) varying between 13.2 and 23.4 mmol/L. This new exercise was then used in the following experiment investigating the effect of plasmapheresis.

Plasmapheresis was performed by harvesting of 7L of plasma per horse which are replaced by 7L of NaCl 0.9%. The technique was performed by using a small-sized plasmapheresis machine commercialized by Hemofenix-France utilizing Trackpore technology (Dubna Moscow region-Russian Federation). The machine is equipped with Rosa® type membrane filters with  $0.4\mu\text{m}$  pores. The system is totally automated operating.

Haematological parameters included the number of red blood cells (RBCs), hemoglobin concentration and hematocrit, the mean corpuscular volume (MCV), the mean corpuscular hemoglobin



**Fig. 1.** Lactate concentrations in six jumping horses. (A): Before and following the exercise test standardized by Demonceau and Auvinet. (B): Before and following the modification of the warm-up phase of the same exercise test. The duration of this phase was doubled to 30 min instead of 15 min and steps were substituted by gallop.

(MCH), the mean corpuscular hemoglobin concentration (MCHC), the number of platelets and also the number of white blood cells (WBCs) and the count of lymphocytes, monocytes, eosinophils and granulocytes. All these parameters were determined using a veterinary cell-counter automate, the Celltac VET MEK-6550 haematology (Nihon Kohden, Tomioka-Japan) and its reagents, Hemolynac·3 MEK-660I, Isotonac·4 MEK-641I, Cleanac MEK-520I (Celltac VET MEK-6550 J/K haematology, Nihon Kohden, Tomioka-Japan). Concerning the biochemical parameters, the concentrations of albumin, globulin, total protein, glucose, alkaline phosphatase (ALP), aspartate aminotransferase (AST), gamma glutamyl transferase (GGT), total bilirubin, lactate, creatinine kinase (CK), urea, creatinine, calcium, sodium and potassium were determined using the veterinary Skyla-VB1 automate analyzer (Lite-On Technology Corporation, Hsinchu-Taiwan). All the chemical reactions completed inside a circular and transparent plastic reagent disc (Equine Panel- Product code 900-150, skyla™ VB1 reagent disc, Hsinchu-Taiwan), containing different reaction cuvettes with specific assay reagent for each measured parameter. Concentrations quantified by photometric measurement of the absorbance changes arising from the chemical reactions in cuvettes' disc are automatically given by the analyzer.

Lactate concentration was assayed using the portable analyzer Lactate-Pro™ 2. This test meter is based on a reaction of the blood lactate with a reagent in the Lactate-Pro™ 2 Test Strip (Busimedico®, S.L. San Sebastián-Spain). To validate and to ensure the accuracy of this technique, blood lactate concentrations measured using the Lactate-Pro™ 2 were compared to those measured by a reference analyzer, COBAS™ Gen.2 using the reagent COBAS INTEGRA Lactate Gen.2 (Roche®, Maylan-France). These analyses were conducted on specimens of six Athlete show jumping horses having performed the developed exercise, as previously described. Blood was sampled before and after the exercise and lactate concentration was immediately assayed by Lactate-Pro™ 2 and COBAS™ Gen.2 analyzers. Measurements from both instruments were tested for correlation.

**For further information concerning the experimental procedures** please see the research article [1] accompanying this data paper.

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## Conflict of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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