Effect of Arabian Mare and Foal Factors on IgG Concentration

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Introduction

- Immunoglobulin G (IgG) is an antibody that identifies and destroys foreign bacteria and viruses as part of the immune system.[3]
- In horses, antibodies are not transferred across the placenta from the mare to the fetus, and foals are born without IgG in their blood.[3]
- Foals receive antibodies and acquire immunity within first 24-36 hours of life via passive transfer when foal nurses on mare's colostrum and antibodies are absorbed across small intestine cells into blood[3] (**Figure 1**).
- A serum IgG concentration of >400 mg/dL is considered adequate passive transfer.[2]
- Failure of passive transfer in foals is associated with increased risk of infection and death.[1]
- The objective of the current study was to create a data set using foaling records from W.K. Kellogg Arabian Horse Center that can be used in future studies to determine factors associated with IgG levels in Arabian foals.

Figure 1: Foal nursing at W.K. Kellogg Arabian Horse Center

Materials & Methods

- Data was collected from 2010 – 2021 foaling records obtained from Cal Poly Pomona's W.K. Kellogg Arabian Horse Center.
- Breeding date, stallion name, milk calcium, foaling date and time, sex, height, weight, standing time, suckling time, placenta passing time, and IgG levels were recorded.
- Foal height and weight were measured using standard equine weight tape (**Figure 2**).
- Foal serum was collected via jugular puncture ~12-hours after birth.
- The concentration of IgG in foal serum was measured using a commercially available, semi-quantitative SNAP Foal IgG test kit (IDEXX; **Figure 3**).

Figure 2. Equine Weight Tape

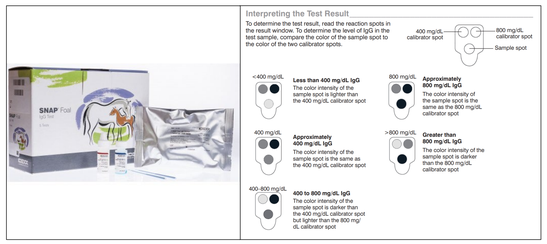

Figure 3. Semiquantitative measurement of foal IgG using a SNAP Foal IgG Test.

Acknowledgments

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Results

- A total of 38 foals (21 fillies and 17 colts), born to 14 mares, were used in the study **(Figure 4; Table 1)**.
- Foaling records were complete for just 2 of the 38 foals **(Table 1)**.
- Of the 38 foals, 11 fillies and 9 colts had IgG levels recorded **(Figure 5)**.
- Serum concentration of IgG was > 400 mg/dl in 10 fillies and 8 colts and two foals had serum concentrations of IgG< 400 mg/dl indicating failure of passive transfer **(Figure 5)**.

Figure 4: Arabian mare and her foal at W.K. Kellogg Arabian Horse Center

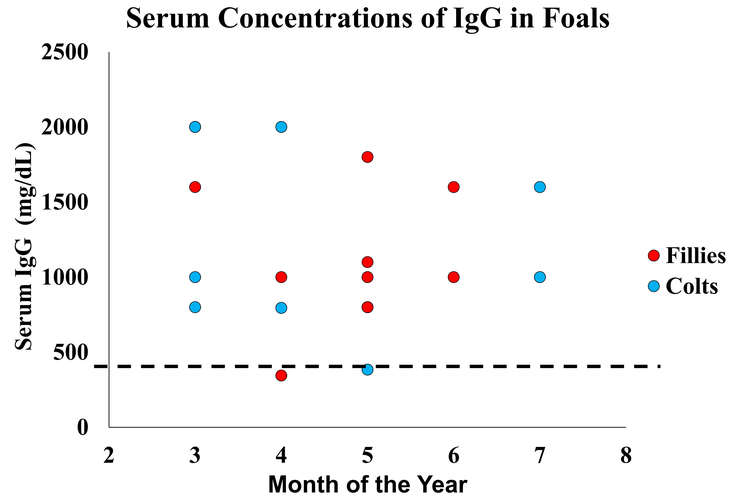

Figure 5: Serum concentration of IgG in fillies (red dots) and colts (blue dots) born during different months of the year. Data are semi-quantitative measurements of IgG in individual animals. Values below the dotted line indicate failure of passive transfer.

Year	# of Mares	Time for foal to stand (min)	Time for foal to suckle (min)	Weight (kg)	Height (cm)	Mean placenta passing time (min)
2021	8	62 ± 6.76	140 ± 5.46	41.7 ± 3.34	97.3 ± 0.90	259 ± 6.07
2020	4	92 ± 5.20	108 ± 7.80	50.0 ± 5.55	94 ± 1.53	246 ± 5.63
2019	4	125 ± 8.55	305 ± 8.91	41.5 ± 7.51	101.1 ± 2.02	70 ± 9.10
2018	3	83 ± 6.32	136 ± 7.34	44.7 ± 2.02	84.3 ± 2.59	61 ± 11.2
2017	7	58 ± 7.05	146 ± 6.02	-	-	289 ± 5.06
2016	5	62 ± 5.96	223 ± 4.60	-	-	36 ± 8.53
2014	1	38 ± 0.00	24 ± 0.00	-	-	-
2013	1	25 ± 0.00	67 ± 0.00	-	-	35 ± 0.00
2012	2	35 ± 0.00	61 ± 16.0	-	-	85 ± 41.5
2011	2	-	-	-	-	214 ± 14.5

Figure 6: Summary of breeding record data for Arabian mares and their foals. Data are mean ± sem. "-" indicates no data available.

Future Directions

- The current study created data set of IgG levels in Arabian foals and physiological and environmental factors that may influence foal IgG levels.
- We will expand the data set to include data from foals born prior to 2010 at the W.K. Kellogg Arabian Horse Center.
- Multiple regression analysis will be used to examine the relationship between mare age and parity, foal sex, month of birth, and foal IgG plasma concentration.
- These data may provide insight into factors that are associated with decreased uptake of IgG and failure of passive transfer in foals.

Contact Information

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