

# Could Argentina Racing Rules use an urinary threshold of Arsenic of 300ng/mL?

Patricia I. Porto<sup>1,✉</sup>

Marina I. Malo<sup>1</sup>

Teresita Zambruno<sup>2</sup>

Cecilia Barbara<sup>1</sup>

Alberto Costa<sup>2</sup>

## INTRODUCTION

In Argentina, like in other regions of the world, there are extensive areas with high levels of arsenic in groundwater. Arsenic, which is naturally present in groundwater has a geological origin. Arsenic-rich soils transfer this element to groundwater (1). The intake of this element from drinking water or food can increase arsenic levels in of exposed individuals (2), (3).

The aim of this work was define if the Arsenic International Threshold of 300ng/mL in urine could be use in Argentine Racing Rules.



## MATERIALS AND METHODS

Arsenic analysis was performed by diluting each urine sample 1/10 with Nitric acid 1% (Suprapur® Merck, Germany) and measured in a coupled plasma emission spectrometer, ICPE-9820, Shimadzu Corporation. The analytical parameters are summarized in table 1.

| Analytical Parameter |         |
|----------------------|---------|
| RF Power (W)         | 1200    |
| Carrier Gas (L/min)  | 0.7     |
| Plasma (L/min)       | 10      |
| Exposure Time (s)    | 30      |
| Direction            | Axial   |
| Wavelength (nm)      | 193.759 |

Table 1: ICPE-OES Analytical Parameters

With each group of samples, a calibration curve and a QC of 300ng/mL were analysed (Curve: negatives urine added at 0-1500ng/mL with arsenic solution 1000ug/mL Chem-Lab, Belgium). The arsenic concentration of samples and QC was determined by interpolation on the calibration curve.

The validated method to analyse arsenic in equine urine by ICP-OES, has a repeatability within days and between days of 8.16% and 8.48%, bias of 0.8ng/mL, LoD 70ng/mL and LoQ 240ng/mL, linearity (0-1,500ng/mL) with R2 ≥ 0.99.

## SAMPLES COLLECTION

In 2019, before the introduction of the Arsenic International Threshold of 300ng/mL to the Argentinian rules of racing, 101 out-of-competition samples from stabled equines from different areas of the country were collected. The distribution of these samples by province is described in Table 2.

| Province     | Number     | %            |
|--------------|------------|--------------|
| Buenos Aires | 45         | 44.6         |
| Entre Ríos   | 25         | 24.8         |
| Santa Fe     | 18         | 17.8         |
| AMBA         | 8          | 7.9          |
| Córdoba      | 3          | 2.9          |
| La Pampa     | 2          | 2.0          |
| <b>TOTAL</b> | <b>101</b> | <b>100.0</b> |

Table 2: Distributions of samples by province

### Race day collection of urine:

Additional, between September 2019 to March 2020, 1,130 post-race samples of San Isidro racecourse were analysed.

## RESULTS AND DISCUSSION

With the results of the 101 samples analysed from different areas of the country, we defined 4 groups considering the LOD (70ng/mL), the LOQ (240ng/mL) and the threshold (300ng/mL). Table 3.

| Groups          | %            |
|-----------------|--------------|
| <70 ng/mL       | 73.3         |
| 70 - 240 ng/mL  | 23.8         |
| 240 - 300 ng/mL | 0.0          |
| > 300 ng/mL     | 3.0          |
| <b>TOTAL</b>    | <b>100.0</b> |

Table 3: Distribution of results.

### Race day collection of urine:

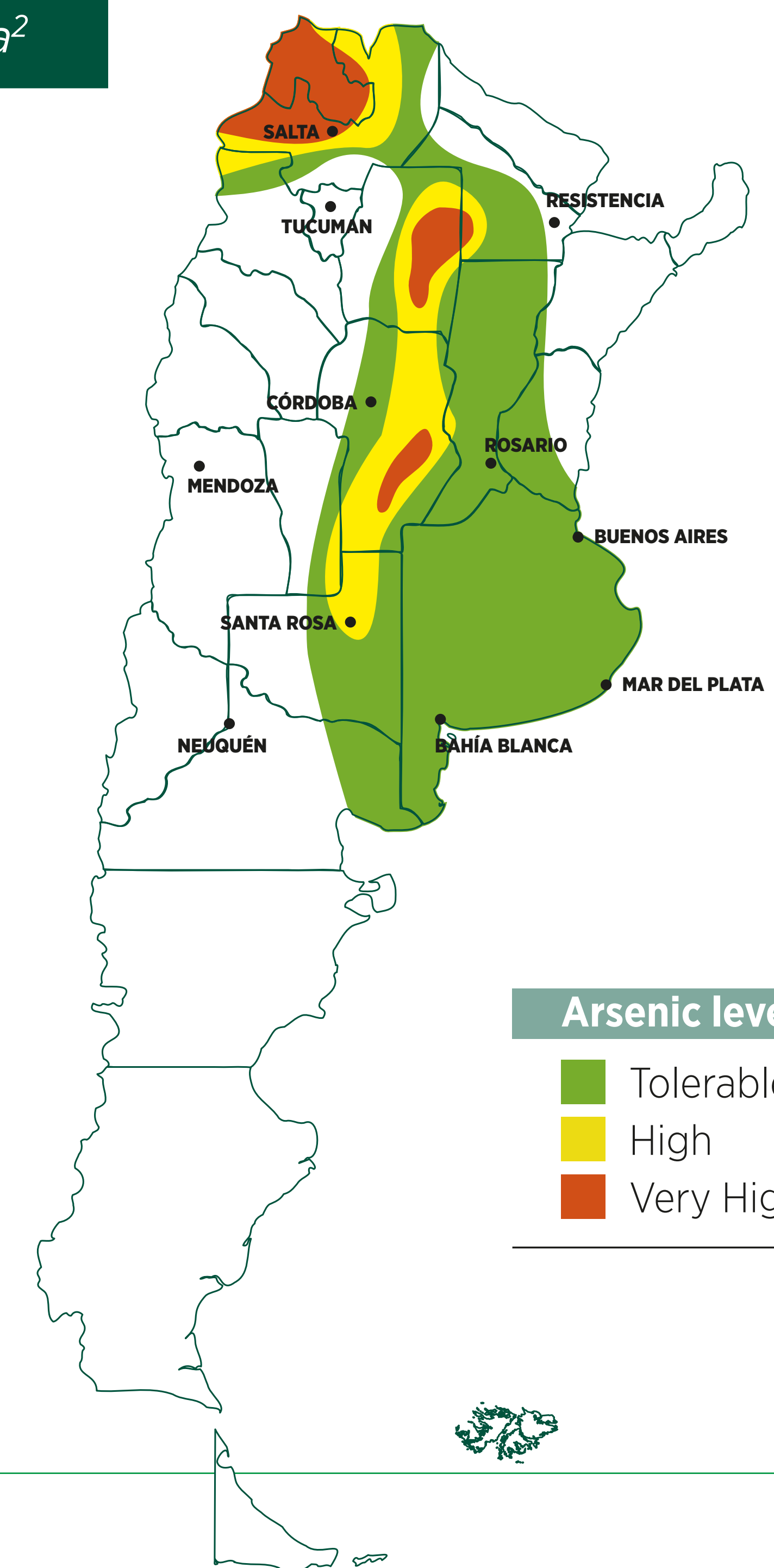
Out of the 1,130 post-race samples analysed, 98.7% were under the threshold. Only in 15 of them, arsenic was found above the threshold. The analysis of the origin of these samples does not allow to define an affected geographical region, while the presence of medication containing arsenic was confirmed in each of the positive cases.

## CONCLUSIONS



Although high arsenic levels are present in groundwater of many Argentinean regions, the intake of this water is not enough for the levels of arsenic in urine to surpass the threshold.

With these results we conclude that the international threshold of 0.3ug/mL is adequate, even for horses stabled in areas with high levels of arsenic in groundwater in our country. And that the determination of arsenic by ICPE-OES is adequate to discriminate between negative and positive samples for this element with this regulatory threshold.



### Arsenic level

- Tolerable
- High
- Very High

## REFERENCES

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- 3- "Urine arsenic levels following consumption of treated timber by horses": S.R. Bailey, C.M. Steel, T. Whittem, G.C. Ganio, J.H. Vine, P.W. Zahra. Proceeding of the 21st International Conference of Racing Analysts and Veterinarians, Uruguay 2016.