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SUPPLEMENTARY DATA

Appendix 1. Sociodemographic characteristics of the participants and their wine consumption habits.

Participation Consent

Inclusion criteria: Adults aged 18 years or older; wine consumers.

If at any point you feel uncomfortable or experience any discomfort, you may withdraw from the study or choose not to complete the questionnaire without providing a reason.

Before completing the sensory questionnaire, please answer the following question:

Do you agree to participate in the sensory evaluation?

( ) I agree to participate in the sensory evaluation

( ) I do not agree to participate in the sensory evaluation

Sociodemographic characteristics of the participant

- What age range are you in?
  - ☐ 18 to 24 years
  - ☐ 25 to 31 years
  - ☐ 32 to 38 years
  - ☐ 39 to 45 years
  - ☐ 46 to 52 years
  - ☐ 53 years or older

- What is your level of education?
  - ☐ Completed technical or university education
  - ☐ Unfinished university education

- What is your sex?
  - ☐ Female
  - ☐ Male

- Do you have any condition that affects your sensory perception?
  - ☐ Yes
  - ☐ Not

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Wine knowledge and consumption characteristics

- What types of wines do you know? (You may select more than one option)
  - ☐ Red wine
  - ☐ White wine
  - ☐ *Rosé* wine
  - ☐ Sparkling wine
  - ☐ Fortified wine

- What type of wine do you drink? (You may select more than one option)
  - ☐ Red wine
  - ☐ White wine
  - ☐ *Rosé* wine
  - ☐ Sparkling wine
  - ☐ Fortified wine

- Based on the sugar content, what type of wine do you drink? (You may select more than one option)
  - ☐ Dry red wine
  - ☐ Semi-dry red wine
  - ☐ Sweet red wine

- How often do you drink wine?
  - ☐ Daily
  - ☐ 1 to 2 times per week
  - ☐ 1 to 2 times per month
  - ☐ 1 to 2 times per year
  - ☐ Other……

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Appendix 2. Sensory evaluation form - Acceptance test and CATA test.

Acceptance test

Sample: …….... Data: …….……...

Instructions: You are receiving a coded sample of wine. Please taste it and answer the following questions.

How much did you like the wine overall?

☐	☐	☐	☐	☐	☐	☐	☐	☐
Dislike extremely	**Dislike very much**	**Dislike moderately**	**Dislike slightly**	**Neither like nor dislike**	**Like slightly**	**Like moderately**	**Like very much**	**Like extremely**

Check-All-That-Apply (CATA) test

Instructions:

Visual aspect: Observe the colours of this wine.

Olfactory aspect: Bring the wine glass close your nose and perceive the aromas associated with the wine.

Gustatory aspect: Take a sip of wine and evaluate the flavours perceived.

Retronasal aspect: Take a sip of wine and then inhale a little air to perceive the aromas retronasally.

Acidic retronasal aroma: The perception of an acid-related aromatic character associated with freshness during exhalation after tasting the wine. Please note that this attribute does not refer to sour taste perceived on the tongue, but to the 'acidic' sensation linked to fruity aromas in the retronasal cavity.



Visual aspect:

Check all the words that describe the wine.

☐ Turbidity	☐ Ruby-red
☐ Colour intensity	☐ Garnet
☐ Clarity/Transparency	☐ Brown
☐ Brightness	☐ Brick-red

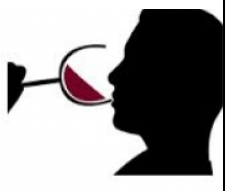


Olfactory aspect:

Check all the words that describe the wine.

☐ Sweet	☐ Nuts fruit
☐ Wood	☐ Herbaceous
☐ Grape	☐ Vinegar
☐ Raisins	☐ Red-fruits

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Gustatory aspects:

Check all the words that describe the wine.

- ☐ Bitter
- ☐ Astringent
- ☐ Sour
- ☐ Spicy/alcoholic
- ☐ Fruity
- ☐ Sweet
- ☐ Grape skin taste



Retronasal aspect:

Check all the words that describe the wine.

- ☐ Wood aroma
- ☐ Acidic aroma
- ☐ Yeast aroma
- ☐ Fig aroma
- ☐ Fruity aroma
- ☐ Raisins aroma

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Appendix 3. Free SO_2 content (mg/L) in Negra Criolla red wine from Tacna (2021 vintage) and Moquegua (2022 vintage).

Days	Vessel 1	Vessel 2	Vessel 3
	Tacna - pre-bottling values (initial wine prior to $K_2S_2O_5$ addition)		
0	6.80 ± 0.40 b C	10.53 ± 0.70 de A	8.40 ± 0.40 f B
	15 mg/L (T_{15})	**30 mg/L (T_{30})**	**45 mg/L (T_{45})**
	Tacna - values during bottle storage (after bottling)		
1	17.60 ± 1.60 a C	33.60 ± 1.60 a B	58.00 ± 0.40 a A
44	6.6 0 ± 0.92 b C	17.13 ± 1.10 b B	32.40 ± 1.44 b A
82	6.17 ± 0.49 bc C	14.13 ± 0.46 c B	27.47 ± 0.46 c A
113	5.93 ± 0.42 bc C	12.27 ± 0.46 cd B	23.13 ± 0.90 d A
167	5.07 ± 0.46 bc C	11.33 ± 0.23 de B	23.33 ± 1.01 d A
199	5.10 ± 0.44 bc C	9.60 ± 0.80 e B	21.33 ± 0.50 d A
231	5.13 ± 0.50 bc C	9.87 ± 0.46 e B	21.53 ± 0.70 d A
259	4.33 ± 0.42 c C	9.33 ± 0.46 e B	18.93 ± 0.46 e A
Days	**Vessel 1**	**Vessel 2**	**Vessel 3**
	Moquegua - pre-bottling values (initial wine prior to $K_2S_2O_5$ addition)		
0	10.37 ± 1.04 f B	10.47 ± 0.38 d B	13.20 ± 1.06 g A
	15 mg/L (M_{15})	**30 mg/L (M_{30})**	**45 mg/L (M_{45})**
	Moquegua - values during bottle storage (after $K_2S_2O_5$ addition)		
7	20.67 ± 0.23 a C	37.20 ± 0.40 a B	65.60 ± 1.60 a A
29	19.53 ± 0.42 ab C	36.00 ± 0.80 a B	60.90 ± 1.68 b A
67	17.53 ± 0.70 bc C	25.60 ± 0.80 b B	51.07 ± 0.61 c A
98	15.20 ± 0.80 cd C	24.33 ± 0.35 b B	45.60 ± 0.80 d A
152	14.03 ± 0.40 de C	16.70 ± 1.57 c B	36.80 ± 0.80 e A
184	11.47 ± 1.22 ef C	14.70 ± 1.28 c B	33.90 ± 1.42 f A
216	12.73 ± 0.90 def C	15.47 ± 0.92 c B	33.60 ± 1.60 f A
244	10.13 ± 1.22 f C	14.67 ± 1.22 c B	31.30 ± 2.01 f A

Values are expressed as mean ± standard deviation ($n = 3$). Different lowercase letters indicate statistically significant differences between sampling dates, while uppercase letters indicate statistically significant differences between treatments (Tukey's test, $p < 0.05$). Tacna wine (T), Moquegua wine (M).

Appendix 4. Dissolved CO_2 content (g/L) in Negra criolla variety red wine from Tacna (2021 vintage) and Moquegua (2022 vintage).

Days	**15 mg/L (T_{15})**	**30 mg/L (T_{30})**	**45 mg/L (T_{45})**
	Tacna - values during bottle storage (after $K_2S_2O_5$ addition)		
44	0.16 ± 0.14 a A	0.26 ± 0.01 a A	0.30 ± 0.04 a A
82	0.24 ± 0.01 a A	0.16 ± 0.14 a A	0.28 ± 0.06 a A
113	0.08 ± 0.13 a A	0.08 ± 0.14 a A	0.24 ± 0.01 a A
167	0.08 ± 0.14 a A	0.16 ± 0.14 a A	0.24 ± 0.01 a A
199	0.00 ± 0.00 a A	0.08 ± 0.14 a A	0.24 ± 0.01 a A
231	0.00 ± 0.00 a A	0.00 ± 0.00 a A	0.08 ± 0.14 a A
259	0.00 ± 0.00 a A	0.08 ± 0.14 a A	0.15 ± 0.13 a A
Days	**15 mg/L (M_{15})**	**30 mg/L (M_{30})**	**45 mg/L (M_{45})**
	Moquegua - pre-bottling values (after $K_2S_2O_5$ addition)		
29	0.34 ± 0.01 a A	0.32 ± 0.02 a A	0.36 ± 0.02 a A
67	0.32 ± 0.02 ab A	0.30 ± 0.03 a A	0.34 ± 0.02 a A
98	0.31 ± 0.04 ab A	0.31 ± 0.01 a A	0.33 ± 0.01 a A
152	0.26 ± 0.01 ab A	0.29 ± 0.03 a A	0.30 ± 0.04 a A
184	0.26 ± 0.04 ab A	0.24 ± 0.02 a A	0.30 ± 0.03 a A
216	0.24 ± 0.01 b A	0.24 ± 0.01 a A	0.27 ± 0.03 a A
244	0.08 ± 0.13 c A	0.24 ± 0.01 a A	0.27 ± 0.03 a A

Values are expressed as mean ± standard deviation ($n = 3$). Different lowercase letters indicate statistically significant differences between sampling dates, while uppercase letters indicate statistically significant differences between treatments (Tukey's test, $p < 0.05$). Tacna wine (T), Moquegua wine (M).

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Appendix 5. Dissolved O_2 content (mg/L) in red wine of the Negra Criolla variety from Tacna (2021 vintage) and Moquegua (2022 vintage).

Days	**Vessel 1**	**Vessel 2**	**Vessel 3**
	Tacna - pre-bottling values (initial wine prior to $K_2S_2O_5$ addition)		
0	0.48 ± 0.41c A	0.72 ± 0.40 c A	0.67 ± 0.07 d A
	15 mg/L (T_{15})	**30 mg/L (T_{30})**	**45 mg/L (T_{45})**
	Tacna - values during bottle storage (after $K_2S_2O_5$ addition)		
1	2.76 ± 0.02 a A	2.36 ± 0.10 a A	2.78 ± 0.12 a A
44	1.24 ± 0.09 b A	1.54 ± 0.32 b A	1.60 ± 0.27 bc A
82	1.52 ± 0.10 b A	1.23 ± 0.12 bc A	1.38 ± 0.25 c A
113	1.58 ± 0.16 b A	1.31 ± 0.10 bc AB	0.93 ± 0.17 cd B
167	2.86 ± 0.30 a A	2.81 ± 0.37 a A	2.25 ± 0.15 ab B
199	3.03 ± 0.16 a A	2.88 ± 0.36 a AB	2.43 ± 0.50 a B
231	3.06 ± 0.29 a A	2.91 ± 0.24 a AB	2.50 ± 0.33 a B
259	3.31 ± 0.43 a A	2.82 ± 0.13 a AB	2.53 ± 0.37 a B
Days	**Vessel 1**	**Vessel 2**	**Vessel 3**
	Moquegua - pre-bottling values (initial wine prior to $K_2S_2O_5$ addition)		
0	0.53 ± 0.13 e A	0.47 ± 0.11 e A	0.51 ± 0.12 g A
	15 mg/L (M_{15})	**30 mg/L (M_{30})**	**45 mg/L (M_{45})**
	Moquegua - values during bottle storage (after $K_2S_2O_5$ addition)		
7	1.88 ± 0.07 c A	1.76 ± 0.08 c A	1.77 ± 0.09 cd A
29	1.67 ± 0.10 c A	1.33 ± 0.09 d A	1.46 ± 0.06 de A
67	1.23 ± 0.13 d A	1.05 ± 0.16 d A	1.21 ± 0.12 ef A
98	1.52 ± 0.21 cd A	1.08 ± 0.13 d B	0.91 ± 0.11 f B
152	2.48 ± 0.13 b A	2.35 ± 0.21 b AB	2.08 ± 0.19 bc B
184	2.54 ± 0.23 b A	2.43 ± 0.17 b A	2.31 ± 0.14 ab A
216	2.96 ± 0.20 a A	2.71 ± 0.14 ab AB	2.46 ± 0.08 a B
244	3.01 ± 0.18 a A	2.90 ± 0.18 a A	2.44 ± 0.10 ab B

Values are expressed as mean ± standard deviation ($n = 3$). Different lowercase letters indicate statistically significant differences between sampling dates, while uppercase letters indicate statistically significant differences between treatments (Tukey's test, $p < 0.05$). Tacna wine (T), Moquegua wine (M).