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UV-VIS CHARACTERIZATION OF AQUEOUS PLANT EXTRACT MIXTURES WITH POTENTIAL GASTROINTESTINAL APPLICATIONS IN CALVES

Adina-Mirela ARITON^{1*}, Silviu-Ionuț BORȘ¹, Ioana POROȘNICU¹, Vasile VINTILĂ¹,
Elena UNGUREANU²

¹Research and Development Station for Cattle Breeding Dancu, Iasi, Sos. Iasi - Ungheni No. 9, Romania
²"Ion Ionescu de la Brad" Iași University of Life Sciences, Mihail Sadoveanu Alley, no.3, Romania

Abstract: Gastrointestinal disorders are common in neonatal calves, leading to impaired growth, increased mortality, and higher veterinary costs. Phytogenic compounds, especially aqueous plant extracts, are gaining attention as natural alternatives due to their antimicrobial, antioxidant, and anti-inflammatory properties. In this study, mixtures of aqueous extracts from medicinal plants traditionally used for gastrointestinal protection were prepared and characterized using ultraviolet-visible (UV-Vis) spectroscopy. The spectra revealed absorption bands associated with phenolic compounds, flavonoids, and other secondary metabolites. These results demonstrate the potential of phytogenic extracts to protect calves against gastrointestinal issues and highlight UV-Vis spectroscopy as a reliable method for preliminary chemical assessment.

• Introduction

- In recent years, there has been increasing interest in phytogenic feed additives—natural compounds derived from medicinal plants—used as alternatives to synthetic antibiotics. These compounds are valued for their antimicrobial, antioxidant, and anti-inflammatory properties, which can help maintain gut health and support the immune system of young animals (*Olagaray et al., 2019*).
- In neonatal calves, gastrointestinal disorders are a major challenge, and a recent study demonstrated that a phytogenic feed additive shortened diarrhoeal episodes in calves, underlining the translational potential of such extracts in livestock practice (*Turini et al., 2022*).
- This work aims to formulate aqueous extracts from medicinal plants traditionally used for gastrointestinal protection in ruminants, to characterise them by UV-Vis spectroscopy, and to evaluate their potential as natural alternatives for supporting gut health in neonatal calves.

• Materials and methods

- Two variants of mixtures of aqueous extracts (noted V1 and V2) based on medicinal plants, known for their beneficial effects on the gastrointestinal tract, were formulated.

• Results and discussions

- ✓ UV-Vis spectroscopic analysis was performed for both mixtures in the range of 250–370 nm (Fig. 3 and Fig. 4).

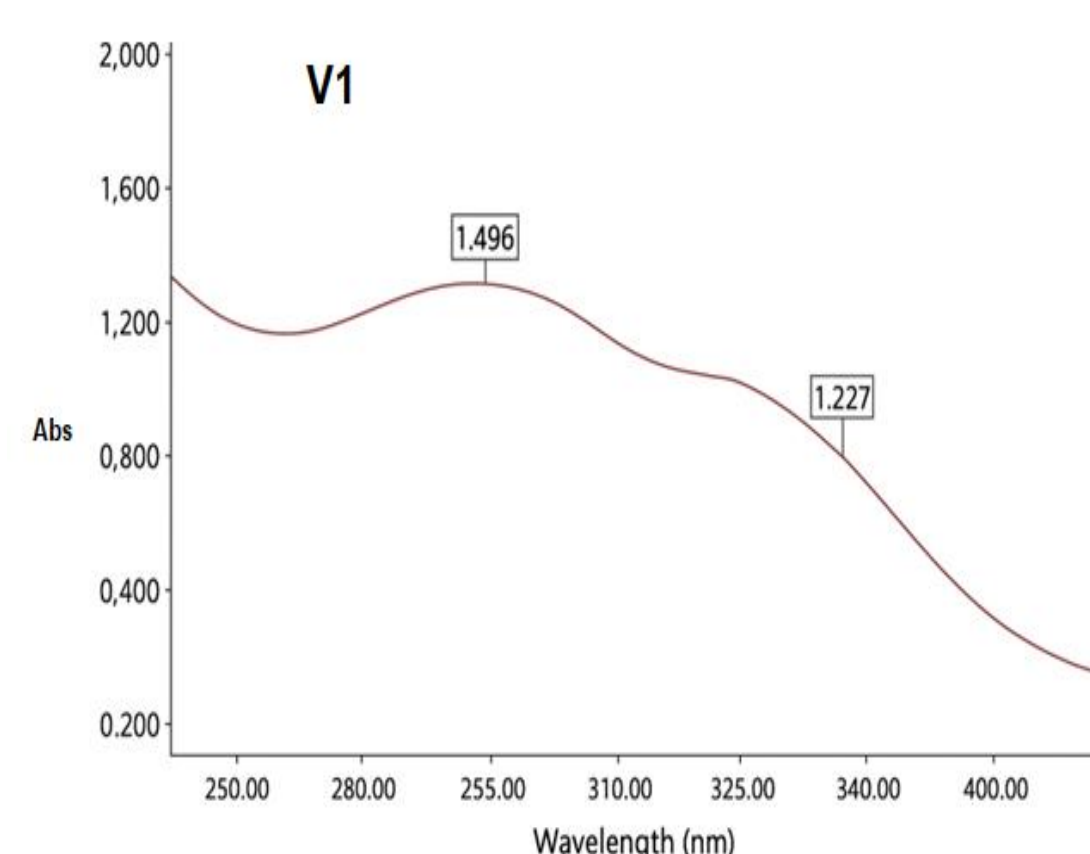


Figure 3. UV-Vis absorption spectrum recorded for extract V1

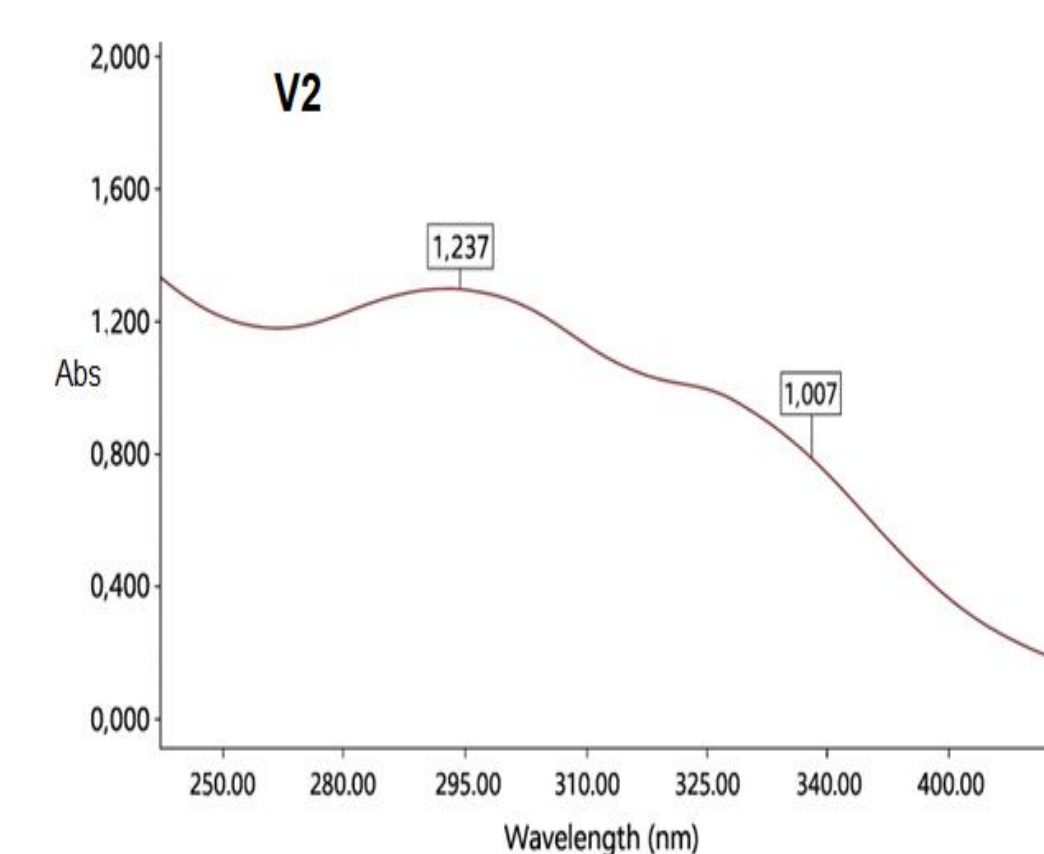


Figure 4. UV-Vis absorption spectrum recorded for extract V2

- Both variants present two main maxima:
- ✓ ~270 nm – corresponding to phenolic compounds (gallic, caffeic, ellagic acids);
- ✓ ~330–340 nm – attributed to flavonoids (quercetin, apigenin, luteolin).
- V1 presents more intense absorptions than V2 in both spectral regions, indicating a higher concentration of phenolic and flavonoid metabolites. This suggests a superior antioxidant and antimicrobial potential.
- V2, although having lower absorptions, contains *Hypericum perforatum* and *Tanacetum vulgare*, plants with different bioactive compounds (hypericin, thujone), which may add complementary anti-inflammatory effects.

• Conclusions

- UV-Vis spectroscopy has proven to be a rapid, reproducible and non-invasive method for the preliminary characterization of phytogenic extracts.
- The spectra confirm the presence of valuable bioactive compounds in both mixtures. V1 appears richer in polyphenols and flavonoids, which recommends it as a more effective variant for gastrointestinal protection in newborn calves.

Figure 1. Schematic representation of the composition of the formulated V1 extract.



Figure 2. Schematic representation of the composition of the formulated V2 extract.

