
ASSESSMENT OF PROXIMATE, PHYTOCHEMICALS, AND ESSENTIAL OIL COMPOSITION OF *ORIGANUM VULGARE* AND *ROSMARINUS OFFICINALIS* LEAF MEALS AS PHYTOGENIC FEED ADDITIVES

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ABSTRACT

The potential of *Origanum vulgare* and *Rosmarinus officinalis* as phytogenic feed additives in poultry diet was assessed. Samples of *Origanum vulgare* and *Rosmarinus officinalis* were processed and chemically analysed to determine proximate, phytochemical and quantitative essential oil (EO) composition using steam distillation procedure. *Origanum vulgare* contains 16.06% crude protein (CP), 7.31% crude fibre (CF), 1.92% ether extract (EE), 69.83% nitrogen-free extract (NFE), and 4.88% ash. *Rosmarinus officinalis* contains 16.81% crude protein, 7.38% crude fibre, 1.8% ether extract, 69.12% nitrogen-free extract, and 4.80% ash. The phytochemical profile revealed that *Origanum vulgare* contained 1.18, 0.67, 2.08, 1.23, and 2.47 mg/kg tannins, saponins, flavonoids, alkaloids, and Triterpenes, respectively while *Rosmarinus officinalis* contains 1.52, 0.67, 2.09, 1.51, and 2.31 mg/kg of tannins, saponins, flavonoids, alkaloids, and Triterpenes contents, respectively. Quantitative essential oil determination revealed 7.69% and 8.14% essential oil content for *Origanum vulgare* and *Rosmarinus officinalis*, respectively. In summary, the findings indicate that *Origanum vulgare* and *Rosmarinus officinalis* possess nutrient levels that could contribute valuable elements to diets, complementing their recognized health and medicinal attributes. The incorporation of these botanicals into livestock's diets may promote a balanced microbiota, potentially leading to enhanced overall performance.

Keywords: Additives, Essential Oil, Health, Phytochemicals, Proximate Composition

INTRODUCTION

Phytogenic feed additives, derived from plants and herbs, have garnered significant attention as alternative to antibiotic growth promoters (Mountzouris, 2016). This was in response to the escalating concerns surrounding antibiotic resistance and its potential impact on human and livestock health (Wang *et al.*, 2021). Oregano (*Origanum vulgare*) and rosemary (*Rosmarinus officinalis*) leaf meals have stood out for their remarkable bioactive compounds and well-documented medicinal usage (Hatzikamari *et al.*, 2021).

Oregano is a species of flowering plant in the mint family Lamiaceae, known for its rich content of essential oils, including carvacrol and thymol, which has exhibited potent antimicrobial and antioxidant properties. Antibacterial effects have been reported for oregano against *Clostridium perfringens*, *Pseudomonas aeruginosa*, and *Staphylococcus aureus* (Coccimiglio *et al.*, 2016). Similarly, Rosemary known for its high levels of rosmarinic acid and flavonoids, has been recognized for its antioxidative and anti-inflammatory effects. Phytochemical studies revealed that rosemary contains terpenoids, essential oils, alkaloids and flavonoids (Ghasemzadeh and Hosseinzadeh, 2020). These attributes have sparked interest in harnessing the therapeutic potential of oregano and rosemary leaf meals as natural phytogenic feed additives. The study was therefore undertaken to evaluate the proximate, phytochemical and essential oil composition of *Origanum vulgare* and *Rosmarinus officinalis* leaf meals.

MATERIALS AND METHODS

Source and processing of *Origanum vulgare* and *Rosmarinus officinalis*

Leaves of *Origanum vulgare* and *Rosmarinus officinalis* were acquired at Sabo market in Sabon-Gari Local Government Area of Kaduna State, Nigeria. After being separated from the stems, the leaves were air-dried for three days in the shade and subsequently crushed using a hammer mill for laboratory analyses.

Chemical analysis of *Origanum vulgare* and *Rosmarinus officinalis*

Samples of *Origanum vulgare* and *Rosmarinus officinalis* were analysed for proximate composition at the Biochemical Laboratory of the Department of Animal Science, Ahmadu Bello University, Zaria, following the methods outlined by AOAC (2010). The phytochemical contents and quantitative determination of essential oil were assessed using the standard method for plant materials, as described by Ejikeme *et al.* (2014), at the Department of Pharmacognosy and Drug Development, Ahmadu Bello University, Zaria.

RESULTS AND DISCUSSION

Proximate Composition of *Origanum vulgare* and *Rosmarinus officinalis* leaves

Table 1 showed the proximate composition of *Origanum vulgare* and *Rosmarinus officinalis*. The findings reveal that *Origanum vulgare* contains 6.06% crude protein (CP), 7.31% crude fibre (CF), 1.92% ether extract (EE), 69.83% nitrogen-free extract (NFE), and 4.88% ash content. This suggests the presence of significant nutrient levels in *Origanum vulgare* which may improve the nutrient level of the leaf meal when incorporated into diets. The analysis of *Rosmarinus officinalis* revealed the values of 16.81% for crude protein (CP), 7.38% for crude fibre (CF), 1.8% for ether extract (EE), 69.12% for nitrogen-free extract (NFE), and 4.8% for ash. This suggests noteworthy nutrient levels in *Rosmarinus officinalis*. The proximate composition analysis results of *Origanum vulgare* and *Rosmarinus officinalis* emphasizes their potential as valuable nutrient sources in livestock diets.

Table 1: Proximate composition of *Ocimum gratissimum* and *Ocimum canum* leaves

Composition (%)	<i>Origanum vulgare</i>	<i>Rosmarinus officinalis</i>
Dry Matter	92.66	91.73
Crude Protein	16.06	16.81
Crude Fibre	7.31	7.38
Ether Extract	1.92	1.89
Ash	4.88	4.80
Nitrogen Free Extract	69.83	69.12

Phytochemical and essential oil Composition of *Origanum vulgare* and *Rosmarinus officinalis* leaves

Table 2 reveals the phytochemical content and the quantitative composition of essential oil in *Origanum vulgare* and *Rosmarinus officinalis*. Results of the phytochemical analysis showed that *Origanum vulgare* contained 1.18, 0.67, 2.08, 1.23, and 2.47 mg/kg tannins, saponins, flavonoids, alkaloids, and Triterpenes, respectively while *Rosmarinus officinalis* contains 1.52, 0.67, 2.09, 1.51, and 2.31 mg/kg of tannins, saponins, flavonoids, alkaloids, and Triterpenes contents, respectively. The phytochemical composition underscores the abundant presence of secondary metabolites in the plant materials, with varying concentrations, accentuating their richness in diverse bioactive compounds. The quantitative determination of the essential oil (EO) content of *Origanum vulgare* and *Rosmarinus officinalis* showed that they contain 7.69% and 8.14 % EO, respectively. This considerable content of EO in these botanicals may be responsible for their high medicinal value, antioxidant and aromatic properties. The phytochemical composition of the oregano used in this study is similar to the report of Veni and Neeru (2013) who indicated the presence of glycosides, steroids, tannings and flavonoids from Oregano.

Another study by Prathyusha *et al.* (2009) and Kalinda and Rioba (2020), indicated the presence of alkaloids, saponins, glycosides, flavonoids, tannins and steroids in both oregano and rosemary leaf meals. This implies that oregano and rosemary are potential sources of phytochemicals most of which have been reported for their medicinal attributes and as an efficient alternative as an antimicrobial agent.

Table 2: Phytochemical composition of *Ocimum gratissimum* and *Ocimum canum* leaves

Components (%)	Concentrations	
	<i>Origanum vulgare</i>	<i>Rosmarinus officinalis</i>
Tannins	1.18	1.52
Saponins	0.67	0.67
Flavonoids	2.08	2.09
Alkaloids	1.23	1.51
Triterpenes	2.47	2.31
Essential Oil*	7.69	8.14

Expressed in percentage (%) per experimental material.

CONCLUSION

In **CONCLUSION**, *Origanum vulgare* and *Rosmarinus officinalis* are rich sources of phytonutrients, offering valuable contributions to dietary nutrition. Additionally, these plants contained diverse arrays of compounds such as tannins, saponins, flavonoids, alkaloids, triterpenes, and essential oils, endowing them with distinctive medicinal properties for use in poultry diets.

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