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Abhishek Sharma

Department of Animal
Nutrition, College of Veterinary
and Animal Science, RAJUVAS,
Bikaner, Rajasthan, India

RK Dhuria

Department of Animal
Nutrition, College of Veterinary
and Animal Science, RAJUVAS,
Bikaner, Rajasthan, India

Corresponding Author:

Abhishek Sharma

Department of Animal
Nutrition, College of Veterinary
and Animal Science, RAJUVAS,
Bikaner, Rajasthan, India

A nutritional evaluation of rosemary leaf powder and black cumin seed powder as phytogetic feed additives

Abhishek Sharma and RK Dhuria

Abstract

Phytogetic feed additives are being considered in the study because their nutritional compositions and functional properties. Proximate composition and mineral contents of two herbs were investigated. The results of the present study showed that the Rosemary leaf powder contained 91.5% dry matter, 5.15% crude protein, 15.20% ether extract, 4.52% crude fiber, 7.50% total ash, 67.63% nitrogen free extract, 1.7% acid insoluble ash, 2.2% Calcium and 0.5% Phosphorus and Black cumin seed powder contained 97.21% dry matter, 20.40% crude protein, 15.69% ether extract, 7.73% crude fiber, 4.98% total ash, 51.20% nitrogen free extract, 0.26% acid insoluble ash, 1.74% calcium and 0.03% phosphorus. The proximate analysis revealed that Rosemary contain low level of crude protein but Black cumin seed rich in crude protein content and both herbs could be used as a potential alternative source of antibiotics and unconventional natural protein source in poultry feeds.

Keywords: Rosemary, black cumin, proximate

1. Introduction

In the modern world, Phytogetic feed additives are receiving considerable attention because of their vast untapped economic potential, especially in the use of herbal medicines. Phytogetic feed additives occupy an important place in the socio-cultural, spiritual and health care aspects in India. Present study reveals that the Phytogetic plants are excellent sources of primary and secondary metabolites. Phytogetic feed additives are gaining much interest in food and biomedical research, resulting from its broad range of uses such as human food, animal feed, poultry feed and bio-fertilizers. Rosemary (*Rosemarinus officinalis* L.) is a woody, evergreen perennial aromatic herb belonging to the family Labiatae, native to the north and south coasts of the Mediterranean Sea. Its leaves are in the form of waxy, slightly curved needles. It is fairly salt and drought tolerant. The most important constituents of rosemary are carnosal, carnosic acid, caffeic acid and its derivatives such as rosmarinic acid. It have following properties; antioxidative (Hras *et al.*, 2000 ^[14], antimicrobial (Shanhidi and Nezt, 2004 ^[25], antidiabetic (Bakirel *et al.*, 2008) ^[5], antitumour, chemopreventive and anti-inflammatory (Shuang-sheng and Rong-liang, 2006; Cheung and Tai, 2007) ^[26, 6], antiparasitic (Moss *et al.*, 2003) ^[22] etc. It improve memorizing, concentrating abilities, digestion and growth performance, prevent brain aging, protection against muscular degeneration, antispasmodic, diuretic, stomach relief, sedative, also improve meat quality (McCarthy, 2001; Smet *et al.*, 2005; Govaris *et al.*, 2007) ^[21, 27, 12] and egg quality (Galobart *et al.*, 2001) ^[8] and used for flavouring foods and beverages. Black cumin (*Nigella sativa* L.) is an aromatic flowering plant in the family *Ranunculaceae* and native to south and southwest Asia. It grows to 20–30 cm (7.9–11.8 inch) tall and has linear lanceolate leaves. It has wide range of medicinal uses (Datta *et al.*, 2012) ^[7] not withstanding its commercial significance as a spice yielding plant. It is used as condiment and has medicinal value for the treatment of cough, asthma and fever. The active constituents of Black cumin seed include volatile oil consisting of carvone, an unsaturated ketone, terpene or dlimonene also called carvene, α -pinene, p-cymene and nigellone (Ramadan, 2007) ^[24]. Pharmacologically active constituents of the volatile oil are thymoquinone, dithymoquinone, thymohydroquinone and thymol (Ghosheh *et al.*, 1999) ^[10], while selenium, DL- α -tocopherol, DL- γ -tocopherol and trans retinol are among important antioxidants present in black cumin seed (Al-Saleh *et al.*, 2006; Nasir *et al.*, 2005) ^[2, 23].

Black cumin seed possess antibacterial activity against Gram positive and negative bacteria (Hanafy and Hatem, 1991) [13], antioxidant (Mariod *et al.*, 2009) [20] and immune- potentiating (Al-Mufarrej, 2014, Kumar *et al.*, 2017a) [1, 18] activities. The Black cumin seed extracts and their oil have a range of other activities, including effects on physio-pathologies, e.g., anti-inflammatory, anti-diarrhoeal properties, and activity in different body systems, e.g., endocrine and immune system (Gilani *et al.*, 2004) [11]. Hereby, both herbs appears to be a potential source of nutrients and has a considerably high feeding value.

Materials and Methods

The present work on the “A nutritional evaluation of Rosemary leaf powder and Black cumin seed powder as phyto-genic feed additives” was conducted in the Department of Animal Nutrition, College of Veterinary and Animal Science, Bikaner- 334001. Both herbs were procured from Local market of Bikaner city of Rajasthan in sufficient quantity and was identified and authenticated by the Department of Botany, Govt. Dugar College, Bikaner (Rajasthan). Stored in airtight plastic containers. Representative samples were taken for further analysis of proximate principles and minerals, particularly calcium and phosphorous.

Determination of dry matter content

Dry matter was determined from dry powder. Dry powder was taken from each sample in a constant weight at 100 °C under atmosphere pressure in an oven for six hours. Then the dry matter was determined by following the conventional procedure, described in ICMR (1971) [15].

Proximate nutrient analysis

Crude protein was actually determined by Kjeldahl method. Ether extract was estimated by Soxhlet apparatus. Crude fiber estimation based on treating fat free sample successively with dilute (1.25%) acid and alkali. Total Ash was determined by Muffle furnace at 600 °C. Nitrogen free extract was determined by subtracting the sum of crude protein, ether extract, crude fiber and total ash (dry matter basis) from 100. All proximate analysis was carried out by the method of AOAC (2007) [4] and the minerals i.e. calcium and phosphorous were estimated by the methods of AOAC (1990) [3].

Results and Discussion

The values of proximate composition of dried Rosemary and Black cumin sample used in the experiment are presented in (Table 1). The dry matter (DM) content of dried Rosemary leaf powder was 91.50 per cent. Rosemary leaf powder contained 5.15% crude protein, 15.20% ether extract, 4.52% crude fiber, 7.50% total ash, 67.63% nitrogen free extract, 1.7% acid insoluble ash, 2.2% Calcium and 0.5% Phosphorus and dry matter (DM) content of dried Black cumin seed powder was 91.50 per cent. Black cumin seed powder contained 20.40% crude powder, 15.69% ether extract, 7.73% crude fiber, 4.98% total ash, 51.20% nitrogen free extract, 0.26% acid insoluble ash, 1.74% Calcium and 0.03% Phosphorus. The crude protein, ether extract, total ash, calcium and phosphorus content of Rosemary leaf powder estimated in the present study was in close agreement with value CP (5.12%), EE (15.40%), TA (7.06%), Ca (2.2%) and P (0.5%) reported by Ghazalah *et al.* (2008) [8]. The observed crude protein value of Black cumin seed powder was in close

agreement with value (20.32) reported by Kumar (2019) [17]. Kabir *et al.* (2019) [16] also reported similar value of dry matter (92.90) percent and crude protein (20.30) percent. while, Sultan *et al.* (2009) [28] reported higher value of Crude protein (22.80%) content in Black cumin seed powder on DM basis than observed in the present study. The variation in the proximate composition of both herbs were may be due differences in agro climatic conditions, maturity and the time of the harvesting (Kutbay and Tolga 2001) [19].

Table 1: Chemical composition of Rosemary leaf powder and Black cumin seed powder (% DM basis)

S. No	Parameters	Rosemary leaf powder	Black cumin seed powder
1	Dry Matter	91.5	97.21
2	Crude protein	5.15	20.40
3	Ether extract	15.20	15.69
4	Crude fiber	4.52	7.73
5	Total ash	7.50	4.98
6	Nitrogen free extract	67.63	51.20
7	Acid insoluble ash	1.7	0.26
8	Calcium	2.2	1.74
9	Phosphorus	0.5	0.03

Conclusion

The result obtained showed Rosemary and Black cumin possess natural nutritional ingredient containing important bioactive components which can be effectively use as preventive or therapeutic purpose in both human and animal health. It proved to contain essential components which would be effective against contagious diseases as well as for better growth performance of both poultry and livestock. In livestock and poultry, both herbs could be supplemented as feed additive for better performance and production benefits. Further, both herbs could be used as alternative of antibiotics and potent natural growth promoter.

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