

## APHRODISIAC IMPACT OF MACA (*Lepidium meyenii*) ROOT IN ANIMALS: REVIEW

\*Gaddafi, S., Yahaya, M.A., Garba, M.G., and Usman, H.B..

Department of Animal Science, Federal University Dutsin-Ma, Nigeria

\*corresponding author: sanigaddafi4@gmail.com: GSM: +234-7067212353

### ABSTRACT

The aim of this review was to highlight aphrodisiac impact of maca (*Lepidium meyenii*) root in animals. Several scientific studies of maca (*Lepidium meyenii*) from reputable journals and book of proceedings were studied and revealed that maca root supplement to different laboratory animals (mice, rat) and Livestock (ram and stallion) has a profound effect on reproductive enhancement and increases fertility in both sexes. Considering these scientific evidences of aphrodisiac roles of maca (*Lepidium meyenii*) in animal models, there are need for reproductive physiologist and animal scientist from different area of specialization to intensified their effort through the uses of aphrodisiac plant in their studies and further explore the mechanism of maca root actions in animal body, better extraction methods, dosage level and forms in farm animals such as cattle, sheep, goat, rabbits, poultry and pig for better reproductive improvement.

**Key Words: Aphrodisiac, Maca, Review**

### INTRODUCTION

An aphrodisiac can be described as any substance that enhances sex drive and or sexual pleasure. Aphrodisiac can also be viewed as any food, drug, scent or device that can arouse or increase sexual drive or libido (Roson and Ashton, 1993). Most aphrodisiac can also heighten other aspect of sensory experience such as light, touch, smell, taste and hearing; and this enhanced sensory awareness contributes to sexual arousal and pleasure (Taberner *et al.*, 1985). Based on their mechanism of actions, aphrodisiacs can be divided into three categories which include: firstly, aphrodisiacs that simply provide a burst of nutritional value, thereby improving the immediate health or wellbeing of the consumer and consequently improving sexual performance and libido. This simple improvement in general health can lead to a burst of energy and translate into an increased sexual appetite. The second group are those with specific physiological effect. That may affect blood flow; mimic the burning of fire of sex and intercourse and increase the duration of sexual activity. The third group of biologically active aphrodisiacs are those that are psychologically active in nature. They actually cross the blood brain barrier and mimic or stimulates some areas of sexual arousal (Wedek, 1961).

Maca is considered as aphrodisiac plant is it commonly known in hausa ‘*Gadali* or *Albasar Tamoji*’ while Yaroba Langaug called it ‘*Isu baka*’. Maca is an adaptogen, which means it helps the body adapt to stress. Maca contains plant sterols which help the body produce the appropriate levels of hormone (Govier *et al.*, 1995). It is traditionally and scientifically proved that maca can enhance fertility in human and animals (Gonzales *et al.*, 2001) since, evidence suggests that maca can increase the libido and sperm count in men (Gonzales *et al.*, 2001) and animal reduce sexual dysfunction in postmenopausal women (Salmon, 1983) and possibly boost female fertility (Joe, 1990).

### Aphrodisiac impact of maca in farm animals

#### Sexual performance of Maca in Male Animals

Several scientific evidences support that maca can enhance sexual performance in ram, Stallion and rodents (Lavana *et al.*, 2013; Del-Prete *et al.*, 2018; Zheng *et al.*, 2000; Cicero *et al.*, 2001; Cicero *et al.*, 2002). For instance, in a study conducted by Lavana *et al.*, using dried black maca in rams, significant increases in libido was measured through increased number of mounts and ejaculations (Lavana *et al.*, 2013). The effects of maca were also observed to last 8 weeks after maca treatment had stopped (Lavana *et al.*, 2013). In 2016 Avelar *et al.*, also reported increases in sexual capacity in low performance rams (Avelar *et al.*, 2016). Diet supplementation of maca showed a beneficial effect on semen quality of

hypofertile and fertile stallion as well as on the quantity of fresh semen and the quality of semen after storage at 5°C up to 72 hours (Del-Prete *et al.*, 2018). Complete intromission number increases in mice administered lipid extract of maca standardized to 0.6% macamides and macaenes.

Maca increases stages of spermiation and germinal cell mitosis by regulating apoptosis which will lead to increasing the number of sperm released during spermiation (Gustavo, 2013). Maca regulates sperm count by maintaining the balance between oxidant and antioxidant status (Yucrfa, 2008). This aphrodisiac activity has been related to its lipidic fraction, which contains mainly fatty acids and macamides (Melnikovona *et al.*, 2015). Maca enhanced activity of testosterone precursor ( $3\beta$ -HSD androstenedione) by increases testicular mRNA level for  $3\beta$ -hydroxysteroid dehydrogenase as gene regulatory protein and steroidogenic enzymes which will lead to increasing production of testosterone (Ohta *et al.*, 2017). Ohta *et al.* reported an increase in testosterone level and size of seminal vesicle in pubertal rats fed with a 60% hydroalcoholic extract of maca (Oshima *et al.*, 2013). While the developmental stage of the rats might have influenced the results, a higher level of testosterone production in leydig cells taken from maca-fed rats and cultivated with 22R-hydroxyprogesterone and pregnenolone *in vitro*. Ample scientific evidences shows maca extract has potential ability to treat erectile dysfunction through significant increase in intracavernous pressure (Zheng *et al.*, 2000; Kimura *et al.*, 2016), maca increases sexual desire and aggressiveness (Poyato *et al.*, 2009; Stone *et al.*, 2009) and considerable increases in physio-chemical characteristics of semen (Tancara *et al.*, 2010; Poveda *et al.*, 2013; Gonzales *et al.*, 2001).

### Reproductive Roles of Maca in Female Animals

*In vivo* study of maca consumption in mice and rat revealed improvement in female fertility with increases level of progesterone (Oshima *et al.*, 2003). Maca-treated group in Ruiz-Lina *et al.* studies revealed improvement in pregnancy rate, larger litter pups size and post-birth survival rate while Gasco *et al.* (2008) studies shows non effect of aqueous extract of maca in oocytes number, uterine weight, and implantation site. Maca promotes optimal functioning of the hypothalamus and the pituitary, thereby improving the functioning of all endocrine glands. It has been recorded the balance effects on FSH, estradiol and Progesterone. Maca powder administration at a dose of 250mg/Kg BW appeared to decrease Estradiol and Progesterone levels at 4 weeks (Meissner *et al.*, 2006) but E2 level was increase at a 500mg/Kg BW dose. Ruiz-Luna *et al.*, study shows an increase in uterine weight in mice administered 1g of aqueous extract/Kg BW. In human maca is considered as alternative drug that will be used to alleviate menopause symptoms of hot flashes, night sweat, depression, vaginal dryness and improves sex life in peri-menopausal and post-menopausal women through restoring hormonal balance in menopause (Hudson, 2008).

### CONCLUSION

Considering the scientific evidences of aphrodisiac roles of maca (*Lepidium meyenii*) in animal models, there are need for reproductive physiologist to further explore the mechanism of action, better extraction methods and dosage form in farm animals such as cattle, sheep, goat, rabbits and pig for better reproductive improvement.

### REFERENCES

- Avelar, A., Orihuela, A., Vazquez, R and Palma-Irizarry, M. (2016). Maca (*Lepidium meyenii*) supplementation increase the sexual capacity of low but not high performance rams (*Ovis aries*). *Boletín Latinoamericano y del Caribe de Plantas Medicinales y Aromaticas*, 15, 122-128.
- Cicero, A.F.G., Bandieri, E and Arletti, R. (2001). *Lepiduum meyenii* Walp. Improves sexual behaviour in male rats independently from its action on spontaneous locomotor activity. *Journal of Ethnopharmacology*, 75, 225-229.

- Cicero, A.F.G., Piacente, S., Plaza, A., Sala, E., Arletti, R. and Pizza, C. (2002). Hexanic maca extract improves rat sexual performance more effectively than methanolic and chloroformic Maca extracts, *Andrologia*, 34, 177-179.
- Del-Prete, C., Tafuri, S., Crani, F., Pasolini, M.P., Ciotola, F., Albanda, S., Carotenuto, D., Pretti, V., Cocchia, N. (2018). Influences of dietary supplement with *lepidium meyenii* (Maca) on Stallion sperm production and on preservation of sperm quality during storage at 5°C. *Andrology*, 6, 351-361.
- Gonzales G.F., Cordova, A., Gonzales, C., Chung, A., Vega, K. and Villena, A (2001). *Lepidium meyenii* (Maca) improved semen parameters in adult men. *Asian Journal of Andrology*, 3, 301-303.
- Govier, F.E., Asase, D., Heffy, T.R., McClare, R.D., Pritchett, T.R. and Weissman, R.M. (1995). Timing of penile color flow duplex ultrasonography using a triple drug mixture. *Journal of Urology*, 153:1472-1475.
- Gustavo, F. (2013). The transillumination technique as a method for the assessment of spermtogenesis using medicinal plants: the effect of extracts of black maca (*Lepium meyenii*) and Camucamu (*Myrciariadabia*) on stages of the spermatogenic cycle in male rats. *Toxicology Mechanisms and Methods*, 23(8).
- Hudson, T. (2008). Maca: New insights on an Ancient Plant. *Intergrative Medicine*, 7, 54-57.
- Joe, F.M. (1990). Erectile dysfunction: sexual response in men. *Archive Sexual Behaviour*, 14:33-39
- Kimura, M., Horie, S., Yamaguchi, R., Muto, S., Ide, H. and Abdelhamed, A. (2016). The influence of maca (*lepidium meyenii*) on the glucose metabolism and erectile function in type 1 diabetic rats. *International Journal of Urology*, 23, 121.
- Lavana, A., Vazquez, R., Palma-irizarry, M. and Orihuela, A. (2013). Effect of maca (*Lepidium meyenii*) supplementation on some libido and semen characteristics in hair sheep rams (*Ovis aries*). *Boletín Latinoamericano y del Caribe de Plantas Medicinales y Aromaticas*, 12, 238-242.
- Meissner, H.O., Mrozikiewicz, P., Bobkiewicz-Kozłowska, T., Mscisz, A., Kedzia, B., Lowicka, A., Reich-Bilinska, H., Kapczynski, W. and Barchia, I. (2006). Hormone-balancing effect of pre-gelatinized organic maca (*lepidium peruvianum chacon*): Biochemical and Pharmacodynamic study on maca using clinical laboratory model on ovariectomized rats. *International Journal of Biomedical Science*, 11, 131-145.
- Melnikovova, I., Tomas, F., Michaela, K. (2015). Effect of *lepidium meyenii* walp. On semen parameters and serum hormone levels in healthy adult men: a double-blind randomized placebo-controlled pilot study. *Hindawi Evidence-Based Complementary and Alternative Medicine*, 2015:324369.
- Ohta, Y., Kawate, N., Inaba, T. (2017). Feeding hydroalcoholic extract powder of *lepidium meyenii* (Maca ) enhances testicular gene expression of 3β-hydroxysteroid dehydrogenase in rats. *Andrologia*, 10, 1111/and. 12792.
- Ohta, Y., Yoshida, K., Kamiya, S., Kawate, N., Takahashi, M., Inaba, T., Hayota, S., Morii, H., Takahashi, K., Ito, M., Ogawa, H. and Tamada, H. (2016). Feeding hydroalcoholic extract powder of *lepidium meyenii* (Maca) increases serum testosterone concentration and enhances steroidogenic ability of leydig cells in male rats. *Andrologia*, 48, 347-354.

- Oshima, M., Gu, Y. and Tsukada, S. (2003). Effect of *lepidium meyenii* walp and *jatropha macrantha* on blood levels of estradiol-17 beta, progesterone, testosterone and the rate of embryo implantation in mice. *The Journal of Veterinary Medical Science / the Japanese Society of Veterinary Science*, 65, 1145-1146.
- Poveda, C., Rodriguez, R., Chu, E.E., Aparicio, L.E., Gonzales, I.G. and Moreno, C.J. (2013). A placebo controlled double-blind randomized trial of the effect of oral supplementation with spermotrend, maca extract (*Lepidium meyenii*) or I-carnitine in semen parameters of infertile men. *International Federation of Fertility Societies 21<sup>st</sup> World Congress on Fertility and Sterility and the 69<sup>th</sup> Annual Meeting of the American Society for Reproductive Medicine, IFFS-ASRM 2013, September 2013 Boston, Massachusetts. United States*. S440.
- Poyato, J.M., Torres, F.J. and Rita, J.M. (2009). New management of hypoactive sexual desire in men: the use of maca: MP-048. *Abstracts of the Joint meeting of the European (ESSM) and international societies for sexual medicine (ISSM)*, 2009 Brussels, Belgium. 94.
- Roson, R.C. and Ashton, A.K. (1993). Prosexual drugs: Empirical status of new aphrodisiac, *Archives of Sexual Behaviour*, 22:521-543.
- Ruina-Luna, A.C., Salazar, S., Aspajo, N.J., Rubio, J., Gasco, M. and Gonzales, G.F. (2005). *Lepidium meyenii* (Maca) increases litter size in normal adult female mice. *Reproductive Biology and Endocrinology*, 3 (no pagination).
- Salmon, P.H. (1983). Psychosexual dysfunction in chronic renal failure: an overview. *Proceedings of EDTNA*, 12:209-212.
- Stone, M., Ibarra, A., Roller, M., Zangara, A. and Stevenson, E. (2009). A pilot investigation into the effect of maca supplementation on physical activity and sexual desire on sportmen. *Journal of Ethnopharmacology*, 126, 574-576.
- Taberner, P.V. (1985). Aphrodisiac-the science and the myth. University of Pennsylvania press, NY.
- Tancara, B.Q., Espinoza, M.S., Cortez, J., Velez, G., Salcedo, Y., Salinas, A.M. and Carvajal, R. (2010). Effect of the *lepidium meyenii* (maca) on the spermatogenesis and the spermatid quality of subjects with diagnosis of infertility: study of cases. *Biofarbo*, 18, 61-70.
- Toose, B.K., Wheeler, M., Nanjee, M., Fenwick, P. and Grant R. (1983). Sex hormones, sexual activity and plasma anticonvulsant levels in male epileptic. *Journal of Neurology, Neurosurgery and Psychiatry*, 46:824-826.
- Wedek, H.E. (1961). Dictionary of Aphrodisiac. New York. Philosophical Library Inc.
- Yucrfa, S., Gasco, M., Rubio, J. (2008). Effect of different fractions from hydroalcoholic extract of Black maca (*Lepidium meyenii*) on Testicular function in adult male rats. *Fertility and Sterility*, 89 (Suppl.) 1461-1467.
- Zheng, B.L., He, K., Kim, C.H., Rogers, L., Shao, Y., Huang, Y.Z., Lu, Y., Yan, S.J., Qien, L.C. and Zheng, Q.Y. (2000). Effect of a lipidic extract from *lepidium meyenii* on sexual behaviour in mice and rats. *Urology*, 55, 598-602.