



Complete replacement of fish meal with potential aquafeed ingredients for rainbow trout in Iran



Hamed Salehi^{1*}, Stefan Reiser¹, Ulfert Focken¹

Introduction

* Currently, Iran ranks among the largest rainbow trout producers in the world. In 2017, annual rainbow trout production exceeded about 20.7% of the global rainbow trout production.

* Based on the national Sixth Five-Year Development Plan in Iran, it was estimated to reach the record of 212 thousand tons rainbow trout in 2020.

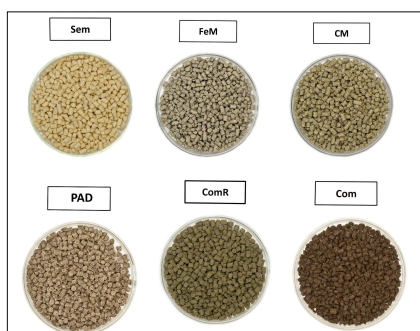
* It is obvious that the currently available fish meal would not be sufficient for that ambitious target. Therefore, the potential of local protein sources should be evaluated in order to compensate for the lack of fish meal and secure both economical purposes and high-quality food in that country.

Materials and Methods

* Six experimental diets were fed to two-hundred-fifty-two juvenile rainbow trout in a random-block design with 18 experimental 57-l rectangular glass aquaria for 72 days.

* TiO₂ was included as an indigestible marker to measure digestibility of experimental diets.

* Growth and feeding efficiency parameters as well as apparent digestibility coefficients (ADC) for nutrients were measured.



Results

* No significant differences were observed for feed intake, weight gain and feed conversion ratio (FCR) among experimental diets.

* The plant-and-animal-based diet (PAD) resulted in a similar protein efficiency ratio (PER) and nitrogen productive value (NPV) to the commercial and the Sem diet.

The performance criteria of fish achieved over the course of a 72 day feeding trial

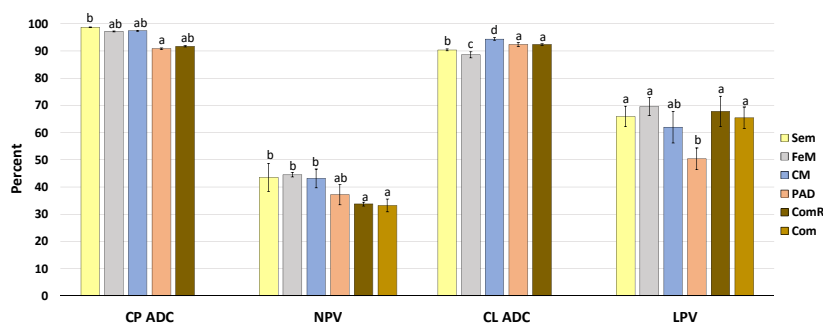
Parameter	Diet *					
	Sem	FeM	CM	PAD	Com	ComR
Initial average weight [g/fish]	30.4 ± 0.2 ^a	30.5 ± 0.3 ^a	30.2 ± 0.3 ^a	30.5 ± 0.2 ^a	30.0 ± 0.6 ^a	30.1 ± 0.3 ^a
Average weight gain [g/fish]	43.8 ± 16.5 ^a	56.1 ± 2.8 ^a	44.6 ± 6.0 ^a	40.3 ± 11.1 ^a	40.4 ± 6.7 ^a	36.7 ± 3.6 ^a
Feed intake [g/fish]	39.4 ± 9.9 ^a	48.9 ± 2.2 ^a	41.0 ± 4.7 ^a	40.1 ± 6.4 ^a	39.8 ± 6.2 ^a	36.2 ± 3.5 ^a
FCR	0.93 ± 0.11 ^a	0.87 ± 0.01 ^a	0.92 ± 0.02 ^a	1.02 ± 0.14 ^a	0.99 ± 0.01 ^a	0.99 ± 0.05 ^a
PER [g]	2.60 ± 0.33 ^{ab}	2.86 ± 0.04 ^b	2.76 ± 0.06 ^{bc}	2.38 ± 0.31 ^{ab}	2.15 ± 0.03 ^a	2.23 ± 0.11 ^{ac}

Sem: casein-based semi-synthetic laboratory standard diet; FeM and CM: diets where 25% of casein in Sem were substituted by feather meal or canola meal on the basis of crude protein, respectively; PAD = plant-and-animal-based diet; Com: commercial diet; ComR: commercial re-pelleted diet.

FCR, feed conversion ratio; PER, protein efficiency ratio

The reported values are the mean of three replicates (n = 3) with their standard deviation (±SD)

The means within rows showing the same superscripts are not significantly different (p < 0.05)



Apparent digestibility coefficients and nutrient productive values of protein and lipids

* All of the formulated diets resulted in a similar lipid productive value (LPV) to the commercial diet, except PAD.

* ADC for crude lipid (CL) and (CP) in both commercial and the plant-and-animal-based diet (PAD) did not differ considerably.

Conclusion

* An acceptable fish growth could be achieved through formulating rainbow trout diets with terrestrial protein sources only. This may help to expand aquaculture production in Iran in an economically feasible manner while natural resources in the *Persian Gulf* and the *Caspian Sea* can be utilized sustainably.