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Importance Of Length-Length And Length-Weight Relations In Crayfish

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Abstract: The measurement of individual's body weight and length is a fundamental procedure in the scientific study of a species. Regression equations of the relationships between length-length and length-weight in crayfish are used to compare populations in terms of condition, growth and development, sexual maturity and populations in different regions. On the other hand, the most important factors affecting the meat yield in freshwater crayfish include ecological characteristics, genetic structure and catching time. In addition, in the determination of meat yield content, the relations between length-length and length-weight are commonly used. In this study, the importance of length-length and length-weight relationships in freshwater crayfish is explained in detail.

Key words: Decapod, population, carapace, abdomen, cheliped, claw.

Kerevitlerde Uzunluk-Uzunluk ve Uzunluk-Ağırlık İlişkilerinin Önemi

Özet: Bireylerin vücut uzunluğu ve ağırlığının ölçülmesi, bir türün bilimsel çalışmasında temel bir prosedürdür. Kerevitlerde uzunluk-uzunluk ve uzunluk-ağırlık arasındaki ilişkilerin regresyon denklemleri populasyonların kondüsyon, büyüme ve gelişme, eşeysel olgunluk ve farklı bölgelerdeki populasyonlarının karşılaştırılmasında kullanılmaktadır. Bununla birlikte, tatlısu ıstakozlarında uzunluk-uzunluk ve uzunluk-ağırlık arasındaki ilişkilerin özellikle ekonomik olarak işletilen populasyonlar açısından da bilinmesi gereklidir. Öte yandan, tatlısu ıstakozlarında et verimini etkileyen en önemli faktörler arasında, ortamın ekolojik özellikleri, genetik yapı ve avlanma zamanı bulunmaktadır. Et veriminin belirlenmesinde ise uzunluk-uzunluk ve uzunluk-ağırlık arasındaki ilişkilerden yaygın olarak yararlanılmaktadır. Bu çalışmada tatlısu ıstakozlarında uzunluk-uzunluk ve uzunluk-ağırlık ilişkilerinin önemi detaylı olarak açıklanmıştır.

Anahtar kelimeler: Dekapod, populasyon, karapaks, abdomen, kiliped kıskaç.

1. Introduction

Crayfish are accepted as keystone species in many lake and streams and they dominate the benthic biomass in many cases. There are more than 600 different crayfish species present worldwide, and they are found in all continents but not in Antarctica [1]. However, approximately 15 freshwater crayfish have been accepted as economically important especially for the last 30 years not only because of their ecological importance due to their spread over such a wide area in the natural environment but also because of the following reasons:

- Use of crayfish shell in pharmacy and medicine as row materials (i.e., chitin and chitosan production) [2-4],
- They are consumed as a luxury feedstuff [5-8],
- Wastes of crayfish processing units (i.e., viscera, muscle and shell) are used as feed additives and fertilizers [9-13],
- Indirect use of crayfish (i.e., keeping crayfish in aquariums as a hobby, recreational, cultural, ethical, aesthetic, scientific and education values) [14, 15].

2. Importance of Length-Length and Length-Weight Relations in Freshwater Crayfish

The crayfish need moult to grow to size. Therefore, the age of the crayfish cannot be determined due to the change of shells. As a result; length-length and length-weight relationships are commonly considered in crayfish instead of age determination. In addition, length-length and length-weight relationships are considered important parameters to obtain information about the following characteristics of crayfish:

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- Comparison of males and females [16-24],
- Estimation of egg size and egg number with growth rate and size in sexual maturity [25- 27],
- Comparison of different species [28-34],
- Comparison of different populations of same species [35-39],
- Determination of condition factor [39-43].

2.1 Determination of length – length relationships

Following body lengths are used to determine length-length relationships in crayfish [16, 33, 38]:

Carapace length (CL),
Carapace width (CW),
Abdomen length (AL),
Abdomen width (AW),
Total length (TL)
Chelae length (ChL),
Chelae width (ChW);
Cheliped length (ChpL)

Figure 1 shows the locations where the measurements of these length patents are taken in crayfish.

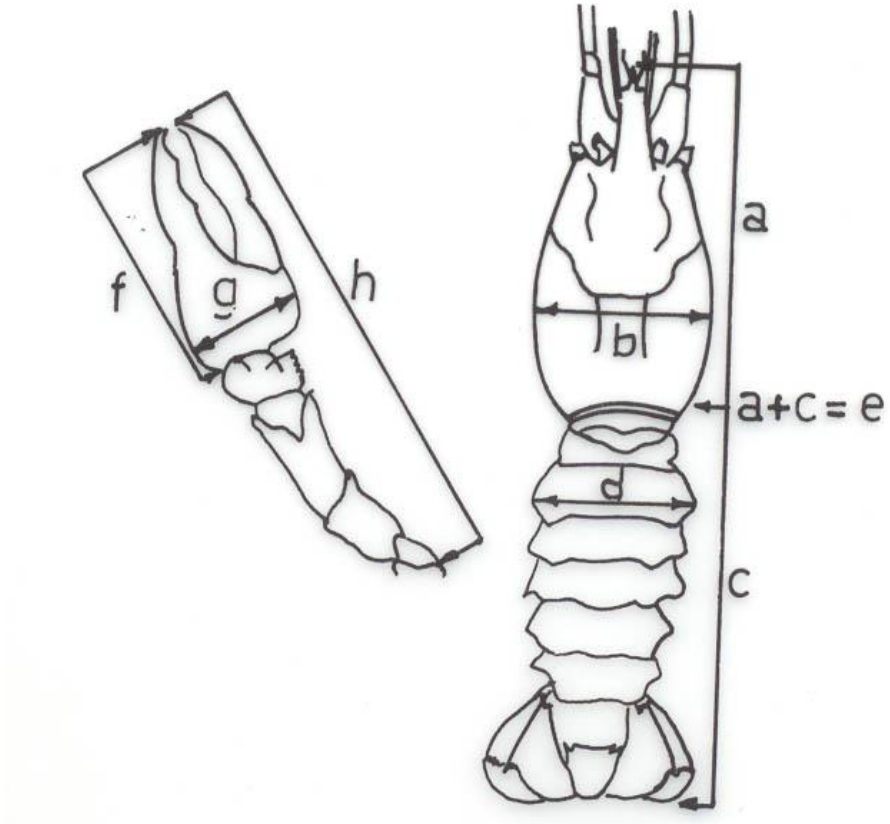

Figure 1. A diagram of freshwater crayfish showing the length measurements taken (adapted from Rhodes and Holdich, 1979) (Legend: (a): CL, from tip of the rostrum to the posteriomedial edge of the carapace, (b): CW, at the widest point of the thorax, (c): AL, from posteriomedial edge of the carapace to the tip of telson (excluding setae), (d): AW, at the widest point of the second segment, (e): TL, from the tip of rostrum to the tip of telson (excluding setae) (carapace length + abdomen length), (f): ChL, from carpal joint to the tip of the propodus, (g): ChW, at the widest point of chelae, (h): ChpL from the tip of propodus to basapodite

On the other hand, the relationship between length parameters is examined in the form below formula:

$$\log y = \log (a) + b \log (x) \quad (1)$$

The linearity of the relationship between the "r" value parameters obtained as a result of the regression analysis; The relationship is isometric when the constant "b" is "3", a negative relationship if "less than 3" and a positive allometric relationship if "greater than 3" [28, 31, 32].

2.2 Determination of length - weight relationships in freshwater crayfish

Carapace length – body weight and abdomen length – body weight relationships are commonly considered to evaluate length - weight relationships in freshwater crayfish. The relationships between length - weight are examined in the form below formula [24, 34, 36, 42, 43]:

$W = aL^b$
W = Body Weight (g)
L = Carapace Length or Carapace Width (mm)

3. Determination of Condition Factor (CF) in Freshwater Crayfish

The condition factor is a parameter that expresses the quantitative effect on the condition of the feed or the feeding method applied [44].

Following formula is used to calculate the nutritional capacity and the conditioning factor that gives information about the nutritional level in crayfish [39-41]:

$$CF = [\text{Body Weight (g)}/(\text{Carapace Length (cm)})^3] \times 100 \quad (2)$$

4. Conclusion

It can be concluded that providing information on the length-length and length-weight relations in crayfish is a crucial procedure in the scientific study of a species (i.e., showing differences between crayfish populations, determining relative growth, comparing populations of the same species, use of morphological charecteristics in the systematic classification of crayfish). The most commonly considered body lengths for crayfish are carapace length, total body (carapace+abdomen) length, and body wet weight. Length-length and length-weight relations are also important when crayfish are subjected to commercial use. In addition, it can be concluded that length–weight relationship of a crayfish species is used to calculate the standing stock biomass. Therefore, understanding the relationship between length-length and length-weight can have significant implications for the culture and management of aquaculture species.

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